

## LEVEL METER

10 kc/s to 17 mc/s · Type Rel 3 D 335 f ...

GENERAL ELECTRIC CO.  
Instrumentation & Control  
228 W. Florence Ave.  
Inglewood, Calif. 90301

### Full Information

Rel-gesamt 3 D 335 f 1a, 1b ... 4a, 4b En · Issue June 1966



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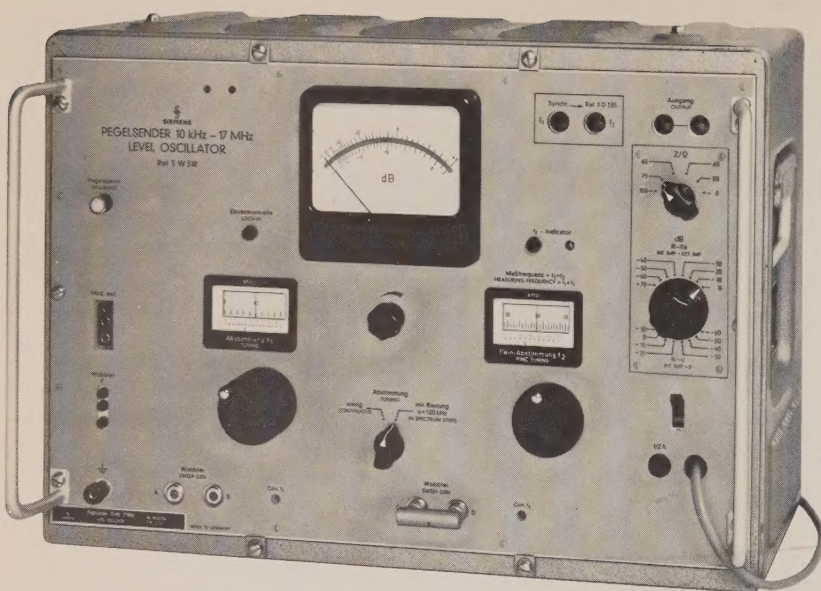


FIG.1 LEVEL METER 10 KC/S TO 17 MC/S Type Rel 3 D 335

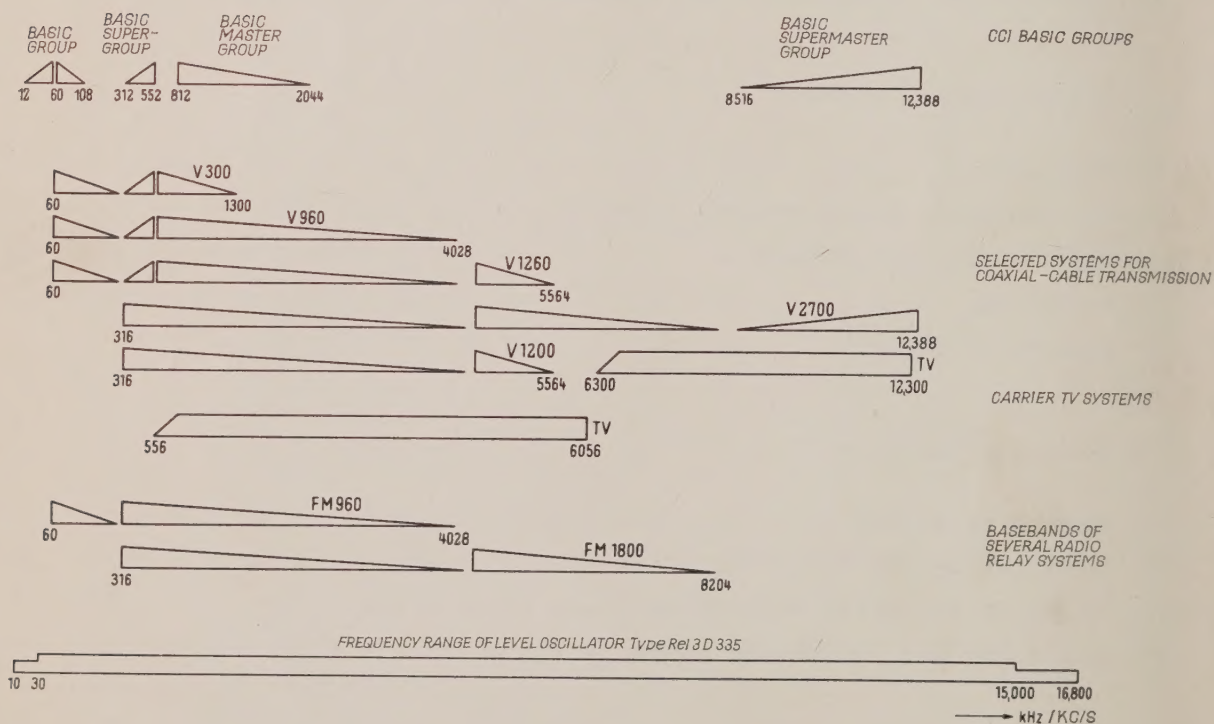


FIG.2 SURVEY OF THE WIDE LINE-FREQUENCY BANDS, BASEBANDS, AND CCI GROUPS WITHIN THE FREQUENCY RANGE OF THE LEVEL MEASURING SETUP

## DESCRIPTION

### I. APPLICATION

The frequency range of this level meter (Fig.1) (10 kc/s to 17 mc/s) includes the transmission bands of multichannel telephone systems establishing up to 2700 channels over coaxial cables or radio links, the carrier television bands, the CCITT-recommended basic groups and basic supergroups as well as the mastergroups and supermaster groups based on the latter (Fig.2).

Its outstanding feature is highly constant and accurate tunability, which can be brought to crystal accuracy by means of an on/off spectrum facility. Owing to this high accuracy, the level meter is suitable for frequency determination, for instance, and for permanently supervising pilot levels in conjunction with a graphic recorder.

The wide level range of 130 db (14 N) makes possible crosstalk and signal-to-distortion ratio measurements, with a high measuring accuracy of level and frequency owing to the high selectivity, image frequency rejection, and the low residual distortion of the level meter.

Because of its well-defined bandwidth and its RMS response, the level meter lends itself to noise level measurements as well. Along with the Type Rel 3 W 518 level oscillator, it forms a high-grade measuring setup that can be used in many ways in carrier engineering.

The level meter can be automatically tuned from the Type Rel 3 W 518 level oscillator if both devices are at the same place. Thus, selective measurements are as quick and easy to carry out as wideband measurements with no error being introduced by mistuning. In swept operation of the level oscillator it is only this synchronized-tuning feature that makes possible selective detection. A level tracer (Type Rel 3 D 346), connected to the IF output of the level meter, is used in this case to record the measured values.

The level meter is available calibrated in nepers or decibels both for voltage and power level measurements (into the built-in switched impedance values in Nm or dbm). The power level into the impedance values provided can also be measured with these level meter models switched for high-impedance input.

Owing to its high selectivity and sensitivity, the level meter is also excellently suited for frequency spectrum analysis (for example, for the examination of harmonics or for spotting which channels within a frequency band are busy). When the level meter is tuned across the frequency band of interest with the Type Rel 3 W 933 sweep attachment, the connected level tracer will display the unknown spectrum.

The Type Rel 3 B 938 probe is available for measuring at high-impedance test points. Measurements on balanced specimens up to 1 mc/s are possible through the Type Rel 3 B 216 ( $Z = 150$  ohms) and the Type Rel 3 B 218 ( $Z = 124$  ohms) balancing transformers.

Signal-to-reflection ratios can be measured point-by-point or in swept operation with the Type Rel 3 R 132 reflectometer bridge attachment.

A further accessory item, the standard unknown alternate-presentation switch, is available for swept comparison measurements of very high accuracy. It alternately connects the specimen and a reference standard to the level meter/level tracer combination. As most errors of the measuring gear cancel out in this method, level deviations as low as some tenths of a percent can be measured.

The applications outlined show that the selective level meter, along with the associated level oscillator, can be used to advantage in developing, testing, and servicing carrier equipment and systems - and that it can even be expanded into a sweep-frequency measuring setup.

The mechanical layout has been adapted to the DIN 41490 style (size A 520 mm by 338 mm by 180 mm). The portable models (suffix f1a to f4a) are in rugged light-metal casings. The rack-mounting chassis models (suffix f1b to f4b), with their slide-on protective covers, fit into each bay whose basic dimensions correspond to the DIN 41490 standard, sheet 1, page 3.

II. ELECTRICAL DATA

Frequency range . . . . . 10 kc/s to 17 mc/s

Scale control  $f_1$  settable from . . . . . 0 to 17 mc/s  
either in spectrum steps of 100 kc/s  
or continuously when the spectrum facilities  
are switched off

Scale control  $f_2$ , continuously adjustable  
from . . . . . -10 kc/s to +100 kc/s  
Minimum readable frequency increment . . . . . about 200 c/s

Frequency error (after frequency calibration,  
spectrum facilities switched on) . . . . .  $\pm 2 \times 10^{-5} \pm 300$  c/s

Mains voltage fluctuations of  $\pm 10\%$  will  
cause spectrum-locked frequency to  
change by . . . . .  $\pm 1 \times 10^{-6} \pm 30$  c/s

|                                                                                                                                      | Model        | f1a            | f2a                                 | f3a          | f4a |
|--------------------------------------------------------------------------------------------------------------------------------------|--------------|----------------|-------------------------------------|--------------|-----|
| Level ranges,<br>switched in steps of . . . . .                                                                                      | 1 N          | 10 db          | 10 db                               | 1 N          |     |
| for voltage levels<br>( $E_0 = 0.775$ v),<br>as referred to the zero mark<br>of the instrument . . . . .                             | -11 to +2 N  | -100 to +20 db | -                                   | -            |     |
| for power levels<br>( $P_0 = 1$ mw),<br>as referred to the zero mark<br>of the instrument . . . . .                                  | -            | -              | -90 to +30 dbm                      | -10 to +3 Nm |     |
| for $Z =$ . . . . .                                                                                                                  | -            | -              | 65,75,135,140,150 <sup>+</sup> ohms | 75, 150 ohms |     |
| Lowest measurable level . . . . .                                                                                                    | -12 N        | -110 db        | -100 dbm                            | -11 Nm       |     |
| Lowest measurable level if the<br>input impedance = $Z$ and if<br>the passband width is 200 c/s<br>between 30 kc/s and 17 mc/s . . . | -14 N        | -125 db        | -115 dbm                            | -13 Nm       |     |
| between 10 and 30 kc/s . . . . .                                                                                                     | -13 N        | -115 db        | -105 dbm                            | -12 Nm       |     |
| if the passband width is 2 kc/s<br>between 30 kc/s and 17 mc/s . . .                                                                 | -13 N        | -115 db        | -105 dbm                            | -12 Nm       |     |
| Measuring error<br>at 1 mc/s and 0 N, 0 db,<br>+10 dbm, +1 Nm . . . . .                                                              | $\pm 0.02$ N | $\pm 0.2$ db   | $\pm 0.2$ db                        | $\pm 0.02$ N |     |

\* Upon request, also 125  $\Omega$  instead of 150  $\Omega$

Error of the input divider,  
as referred to the position

0 N, 0 db, +10 dbm, +1 Nm

|               |         |           |
|---------------|---------|-----------|
| at 1 mc/s     | ±0.1 db | (±0.01 N) |
| up to 10 mc/s | ±0.3 db | (±0.03 N) |
| up to 15 mc/s | ±0.5 db | (±0.05 N) |

Frequency response within one setting  
of the input divider

|                         |             |           |
|-------------------------|-------------|-----------|
| from 30 kc/s to 10 mc/s | ±0.2 db     | (±0.02 N) |
| from 10 kc/s to 15 mc/s | ±0.3 db     | (±0.03 N) |
| Drop at 17 mc/s         | about -3 db | (-0.35 N) |

Additionally, when the attenuation of

LOW NOISE switch S7 is in circuit

|  |         |           |
|--|---------|-----------|
|  | ±0.2 db | (±0.02 N) |
|--|---------|-----------|

Mains voltage variations of ±10% will cause

indication to vary by

|  |         |           |
|--|---------|-----------|
|  | ±0.2 db | (±0.02 N) |
|--|---------|-----------|

Selectivity, switched

Wide band:

|                                              |                                                                     |
|----------------------------------------------|---------------------------------------------------------------------|
| Frequency range                              | 30 kc/s to 17 mc/s                                                  |
| Passband for $\Delta a \leq 0.2$ db (0.02 N) | $f_m \pm 300$ c/s                                                   |
| $\Delta a \leq 0.5$ db (0.05 N)              | $f_m \pm 800$ c/s                                                   |
| Bandwidth for $\Delta a = 3$ db (0.35 N)     | about ±1.55 kc/s<br>(corresponds to the width of one voice channel) |
| Stop-band attenuation at $f_m \pm 4$ kc/s    | about 60 db (7 N)                                                   |

Narrow band:

|                                           |                    |
|-------------------------------------------|--------------------|
| Frequency range                           | 10 kc/s to 17 mc/s |
| Passband for $\Delta a < 0.5$ db (0.05 N) | 200 c/s            |
| Stop-band attenuation at $f_m \pm 1$ kc/s | about 35 db (4 N)  |
| at $f_m \pm 2$ kc/s                       | about 52 db (6 N)  |

Intermediate frequencies

|                                                                                                     |
|-----------------------------------------------------------------------------------------------------|
| $f_{z1} = 21$ mc/s; $f_{z2} = 1.5$ mc/s;<br>$f_{z3} = 50$ kc/s; $f_{z4}$ (at output jacks) = 3 kc/s |
|-----------------------------------------------------------------------------------------------------|

Image frequency rejection

|                                       |                     |
|---------------------------------------|---------------------|
| for $f_m + 2f_{z1}$                   | about 60 db (7 N)   |
| for $f_m + 2f_{z2}$ ; $f_m + 2f_{z3}$ | about 74 db (8.5 N) |
| for $f_m + 2f_{z4}$                   | about 60 db (7 N)   |

Attenuation of a voltage at one of the

intermediate frequencies  $f_{z1} + f_{z4}$  at the input

|  |                   |
|--|-------------------|
|  | about 80 db (9 N) |
|--|-------------------|

Residual distortion  $a_{k2}$  and  $a_{k3}$

in the frequency range from 30 kc/s

onward when the sensitivity is

increased by 50 db (6 N)

|  |               |
|--|---------------|
|  | ≥ 65 db (8 N) |
|--|---------------|

between 10 and 30 kc/s

when the sensitivity is increased

by 40 db (5 N)

|  |               |
|--|---------------|
|  | ≥ 65 db (8 N) |
|--|---------------|

Input impedance . . . . . high  
 corresponding to an input capacitance of . . . . . about 40 pf  
 can be switched to the nominal values of  
 in model 1.. (N) . . . . . 50, 60, 65, 75, 150 ohms  
 in model 2.. (db) . . . . . 50, 60, 65, 75, 150 (135<sup>+</sup>) ohms  
 in model 3.. (dbm) . . . . . 65, 75, 135, 140, 150 (125<sup>+</sup>) ohms  
 in model 4.. (Nm) . . . . . 75, 150 ohms

Reflection coefficient of the input at Z = 75 ohms  
 at 10 mc/s . . . . .  $r \leq 0.03$   
 at 15 mc/s . . . . .  $r \leq 0.05$

AC output  
 Intermediate frequency . . . . . 3 kc/s  
 Output level, as referred to  
 0-db (O-N) mark of the instrument . . . . . +20 db (+2.3 N)

DC output  
 DC at Z = 2.5 kilohms,  
 as referred to 0-db (O-N) mark of the instrument . . . . . 77.5  $\mu$ s

Power supply . . . 110, 130, 220(230), 240 v  $\pm 10\%$ ; 48 to 60 c/s; about 100 va

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<sup>+</sup> Instead of 150 ohms, upon request

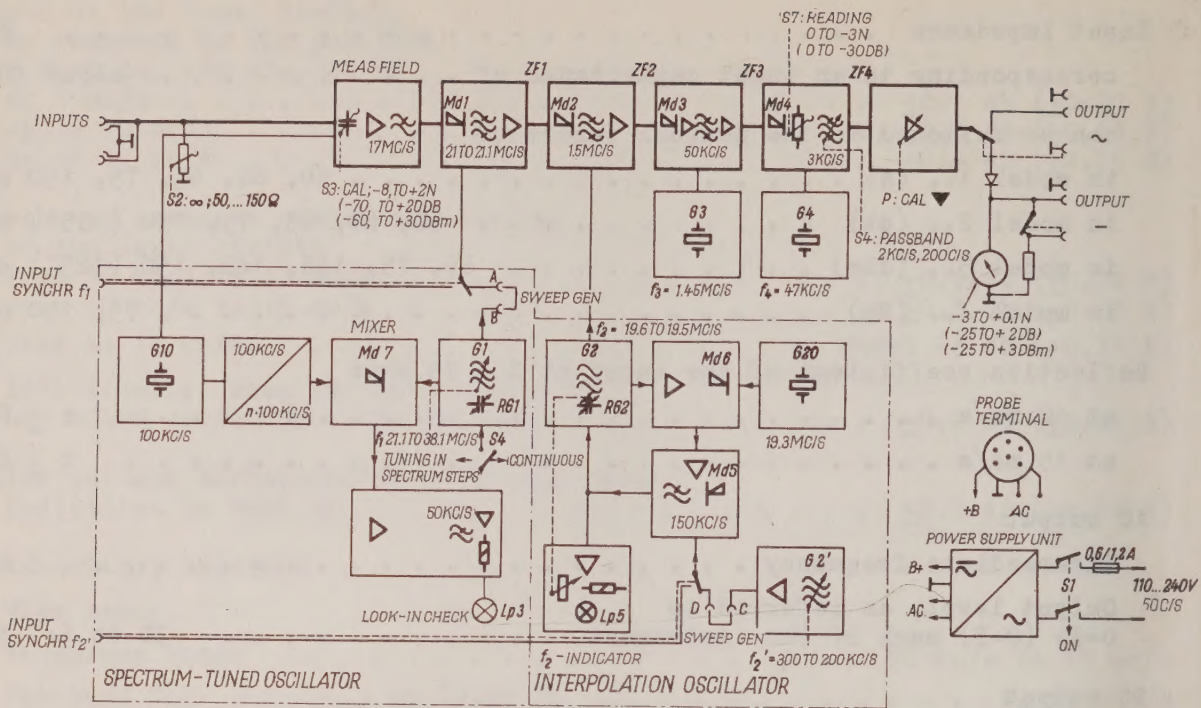


FIG. 3 BASIC CIRCUIT DIAGRAM OF THE LEVEL METER

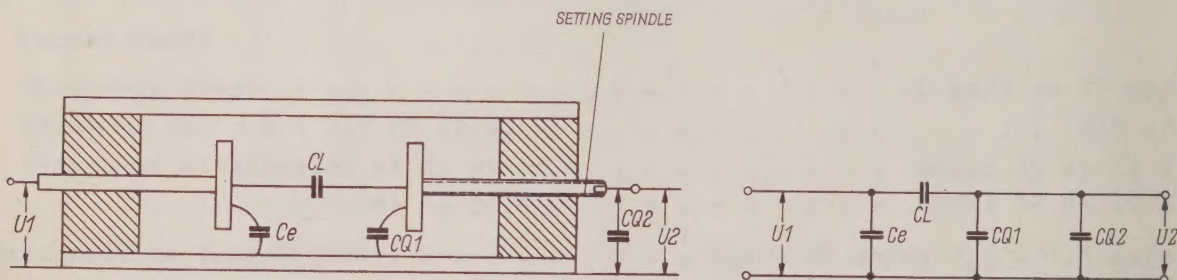


FIG. 4 SCHEMATIC LAYOUT AND EQUIVALENT CIRCUIT OF A WAVEGUIDE ATTENUATOR

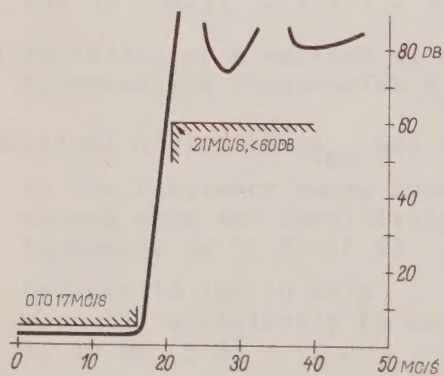


FIG. 5 ATTENUATION-VS-FREQUENCY RESPONSE OF THE 17-MC/S LOW PASS FILTER

## III. FUNCTIONING AND LAYOUT

### A. Level Meter Type Rel 3 D 335

The heterodyne-type level meter is designed to meet the special demands of carrier transmission engineering. Its frequency range of 10 kc/s to 17 mc/s corresponds to that of the Type Rel 3 W 518 level oscillator, with which it forms the measuring setup.

The voltage under test is brought to a last intermediate frequency in the audio range (3 kc/s) in four stages of frequency translation before it is applied to either the indicating circuit or the (AC) output jack. The characteristics of the conversion oscillators G1 to G4 determine the tuning accuracy and constancy. As in the case of the Type Rel 3 W 518 level oscillator, the tunable oscillators G1 and G2 therefore have a spectrum and interpolation facility, while the oscillator units G3 and G4 are crystal-controlled. The level meter can be continuously tuned for spotting unknown frequencies or frequency spectra. The frequency accuracy is best, however, when the 100-kc/s spectrum facility is activated. Frequencies between two adjacent spectrum lock-in points can then be continuously set with the interpolation oscillator G2.

As shown in the basic circuit diagram of the level meter (Fig.3), the oscillator units G1 and G2' can also be replaced with the corresponding oscillator units of the Type Rel 3 W 518 level oscillator by way of the SYNCHR f1 and SYNCHR f2 inputs. This means considerably simplified operation, because the receiver is automatically also tuned when the transmitting frequency is being set.

The input impedance of the level meter is high and capacitive ( $C \approx 40 \text{ pF}$ ). Switch S2 connects built-in terminations between 50 and 150 ohms across the input. It also secures the Z/600 ohm correction on the level meters for direct measurements of power levels ( $P_0 = 1 \text{ mw}$ ). It has two positions, one for a high-impedance input, and one for an input terminated into Z.

The measuring voltage is first applied to the level range switch S3 in the measuring panel (see Rel str 35 D 330f... En). Through the two decks of switch S3 each alternate switching step brings into circuit another capacitive attenuator (differing by 20 db<sup>+</sup> from the preceding one). In the inter-

<sup>+</sup> This note and the following information apply analogously to the devices calibrated in N, dbm, and Nm.

mediate steps S3 switches relay A, which in turn brings into circuit a resistive 10-db divider following the preamplifier. Shorting wipers of switch S3 ground the inactive attenuators to avoid capacitive coupling.

The capacitive attenuators are designed as waveguide dividers, which guarantees very low series arm capacitances ( $C_L$ ) as required (cf. Fig.4). For example, the series-arm capacitance of the 80-db attenuator is 0.01 pf. The divider ratio is determined by the series-arm capacitance  $C_L$  and the shunt-arm capacitances  $C_{Q1}$  and  $C_{Q2}$ . If we assume that the electrode spacing of a waveguide beyond-cutoff divider exceeds  $1/4$  of its diameter, the logarithm of its dividing ratio will increase linearly with the electrode spacing. Such waveguide dividers therefore have the advantage of providing a possibility of setting all attenuation values with the same accuracy. The shunt-arm capacitances of all dividers are equal (100 pf), so that the input capacitance of the following amplifier has the same effect on all attenuators.

The wideband preamplifier (frequency range 10 kc/s to 17 mc/s) following the divider is equipped with two CCa tubes. Owing to the degenerative circuit selected, the amplifier provides constant gain and only a minimum of nonlinear distortion. The first stage is of the cascode type, the second is an asymmetrical pushpull circuit. Its voltage gain of 12 db compensates for the voltage losses as far as the Md1 modulator, inclusive of the switched-in image-frequency stop filter (17 mc/s low-pass filter). To this end, the same low-pass filter as in the oscillator is used (for the attenuation/frequency response see Fig.5).

Md1 consists of a ring modulator with two differential transformers.

Oscillator unit G1 (see Fig.6 and Rel str 35 D 328f...), which can be continuously tuned from 21.1 to 38.1 mc/s, uses a Colpitts circuit with one section of a CCa tube. The reactance network RG1 (varactor diodes Gr3 and Gr4), which, in spectrum-locked operation, retunes the oscillator to a crystal-accurate frequency, is connected across one half of the variable tuning capacitor.

The oscillator voltage, extracted through a cathode follower, is applied to modulator Md1 through a two-stage amplifier installed in the measuring panel subassembly.

In spectrum-locked operation, the readjusting circuit causes the oscillator frequency (21.2 to 38.2 mc/s) to be exactly and rigidly locked to the

212th to the 382nd harmonics of a 100-kc/s crystal oscillator. It works as follows:

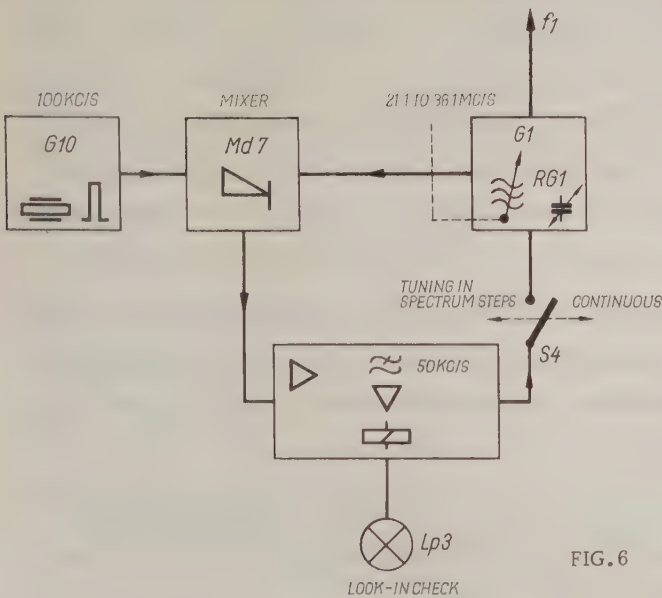


FIG.6 BASIC CIRCUIT DIAGRAM OF THE LOCK-IN TUNED OSCILLATOR UNIT G1

Crystal oscillator G10 generates a 100-kc/s sinewave that the following harmonic generator stages shape to a very narrow pulse with a repetition frequency of 100 kc/s. This pulse voltages and the oscillator voltage of the continuously tunable oscillator unit G1 are applied to mixer Md7. Its output also supplies a 100-kc/s pulse voltage whose amplitude is determined by the instantaneous value of the sinewave voltage that coincides with the input pulse, i.e. the crest value is given by the difference between the relative phases of the oscillator and spectrum voltages. The amplified and rectified pulse voltage is applied through a 50-kc/s low-pass filter to the reactance network of oscillator unit G1. If the frequency of oscillator unit G1 is close to an integral multiple of 100 kc/s, a DC voltage is formed whose magnitude varies the capacitance value of the varactor diodes as required for readjusting the frequency. Whenever the frequency tuning condition of G1 is outside the holding range, an AC voltage is generated because the 100-kc/s pulse constantly encounters different instantaneous values of the sinewave voltage. This AC voltage sweeps the frequency of oscillator unit G1 when the frequency setting is between two adjacent holding ranges. The locked condition of the oscillator gives rise to a DC voltage, while otherwise an AC voltage will appear. The circuit uses this difference

as a criterion for the spectrum check and indication. A lamp shows the locked condition of the oscillator.

The first intermediate frequency  $f_{m1}$ , appearing after modulator  $M_{11}$  is between 21.0 and 21.1 mc/s, because the frequency of the voltage under test may deviate from the 100-kc/s spectrum frequency by 100 kc/s at most. The following 21-mc/s band-pass filter, whose attenuation/frequency response is shown in Fig. 6, features a very low passband distortion in this range. An attenuation pole of  $a_{sp} \geq 80$  db at  $f = 18$  mc/s suppresses the image frequencies.

A two-stage cathode follower is interposed between the bandpass filter and the second modulator to act as an impedance transformer. Two resonant circuits with voltage transformation offset the attenuation of the first modulator and that of the 21-mc/s filter.

Ring modulator  $M_{12}$  receives its carrier voltage from the interpolation oscillator  $O_1$  (Fig. 7), whose frequency can be continuously varied by the difference between two lock-in points (100 kc/s).

The frequency accuracy of the level meter is determined by the accuracy of the spectrum oscillator  $O_1$  as well as by oscillator unit  $O_2$ , serving to adjust the frequency finely. This is the reason why this oscillator is equipped with the interpolation device described below.

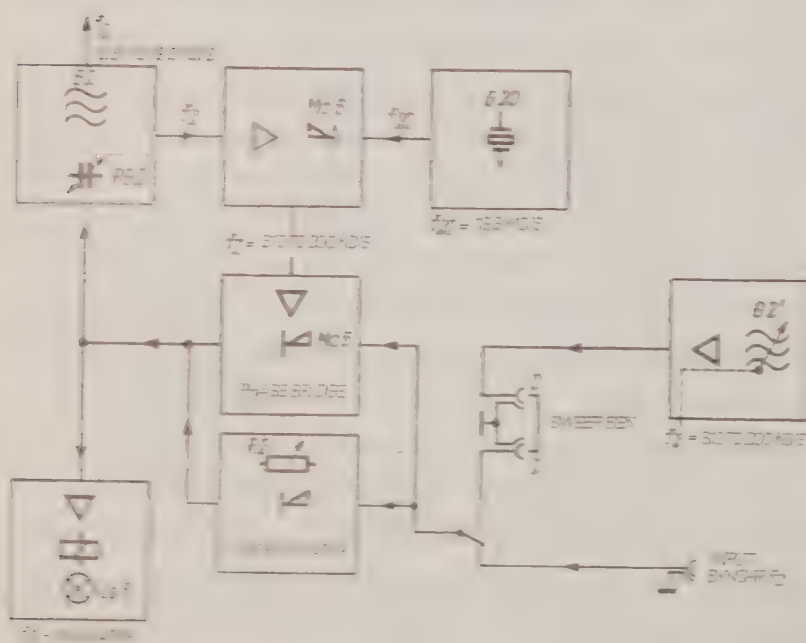


FIG. 7  
BASIC CIRCUIT DIAGRAM  
OF THE INTERPOLATION  
OSCILLATOR.

The interpolation device is based on the principle that a sum frequency is formed from a high-frequency, crystal-stabilized oscillation and a low-frequency, variable oscillation. The error of the variable-frequency oscillation will then contribute to the error of the sum frequency only in the ratio of the variable to the crystal-stabilized oscillation. In the case of this interpolation oscillator the ratio is about 1:100, and from this fact it follows that the output frequency virtually has crystal accuracy.

The resonant circuit of oscillator G2 contains a varactor diode (reactance network RG2) through which the frequency  $f_2$  can be varied between 19.6 and 19.5 mc/s by means of a suitable voltage.

In modulator Md6 the frequency  $f_2$  is translated to an IF position between 310 and 200 kc/s with the aid of frequency  $f_{20}$  (19.5 mc/s) of the crystal-controlled oscillator G20. This IF is applied through an amplifier to phase bridge Md5, which compares the IF with the frequency of oscillator unit G2', capable of tuning between 310 and 200 kc/s. Its variable capacitor is coupled to the fine scale  $f_2$  of the level meter. If the frequencies reaching the phase bridge are nearly equal, the output of the phase bridge will deliver a DC voltage whose magnitude and polarity depend on the phase relation between the two reference voltages. With the aid of the reactance network R22, this voltage readjusts oscillator unit G2 to the frequency which, after having been translated, corresponds to the frequency of oscillator unit G2'. As the phase bridge is designed to compensate for small differences of  $f_2'$  and  $f_2$  only, the voltage of oscillator unit G2' is simultaneously applied to a discriminator which furnishes a DC voltage proportional to the frequency of oscillator unit G2'. This coarsely regulating voltage is applied to the reactance network to adjust the frequency of oscillator unit G2 so that the IF falls into the regulating range of the phase bridge. At the same time an AC voltage is superimposed on this voltage to sweep the frequency of oscillator unit G2 to cut down the time it takes for the frequency to fall into the capturing range of the phase bridge. It is automatically disconnected after the phase bridge has been balanced.

The sum frequency and the carrier leakage of the phase bridge are suppressed by a low-pass filter preceding the reactance network.

The 11-10001002 lamp lights up to indicate the balanced condition of the bridge. It is switched by a relay that, through an amplifier, responds to the criterion "DC Voltage at Phase Bridge Output" and also disconnects the AC voltage superimposed on the positioning voltage.

A DC voltage, varied with R2 "f<sub>2</sub>-INDICATOR", is superimposed on the discriminator voltage. It is so adjusted that the deviation of the intermediate frequency from the frequency of oscillator unit f<sub>2</sub>' becomes a minimum.

During the adjusting phase the output voltage of the phase bridge is applied to the instrument of the level meter through the contacts of the pushed f<sub>2</sub>-INDICATOR button. The frequencies are equal when the reading is a minimum.

Together with the 1st IF the frequency of oscillator unit G2 results in a fixed intermediate frequency f<sub>z2</sub> of 1.5 mc/s at the output of modulator Md2. This IF is selected by the following 1.5-mc/s bandpass filter (Fig.3). Fig.9 shows the attenuation/frequency response of the 1.5-mc/s bandpass filter. Again, the attenuation pole at f = 1.4 mc/s serves to suppress the image frequencies. As the input impedance of the bandpass filter is Z<sub>e</sub> = 600 ohms and its output impedance is Z<sub>a</sub> = 30 kilohms, the resultant voltage gain is 17 db. A cathode follower is used to match the high-impedance filter output to the low-impedance input of the next modulator Md3.

Ring modulator Md3 translates the second intermediate frequency of f<sub>z2</sub> = 1.5 mc/s to the third IF of f<sub>z3</sub> = 50 kc/s. The carrier voltage of f<sub>3</sub> = 1.45 mc/s is supplied by crystal oscillator G3.

The IF voltage f<sub>z3</sub> is first applied to a three-stage degenerative R-C amplifier. In order to secure constant gain despite mains voltage fluctuations, this amplifier provides both AC (voltage) and DC degeneration.

The following 50-kc/s bandpass filter determines the bandwidth of the level meter in the position PASS BAND WIDTH 2 KC/S. In the pass band the attenuation distortion at 50 kc/s  $\pm 1$  kc/s is about 0.5 db (see Fig.10). Its bandwidth (Δa = 3 db) is about 3.1 kc/s to assure that this filter simulates the width of a voice channel as realistically as possible. A voltage gain of about 17 db is achieved by transforming the image impedance of the filter from 600 ohms to 30 kilohms. The filter termination is formed by two series-connected resistors. The tap between the resistors corresponds to an attenuation of 10 db (1 N). Only in the positions of -10 db and -30 db (-1 N and -3 N) of switch S7 (LOW DISTORTION) relay B cuts out this attenuation to apply the full level from the filter output to the following amplifier.

The output transformer of this two-stage R-C coupled amplifier has a differential winding at its secondary end to which ring modulator Md4 is connected.

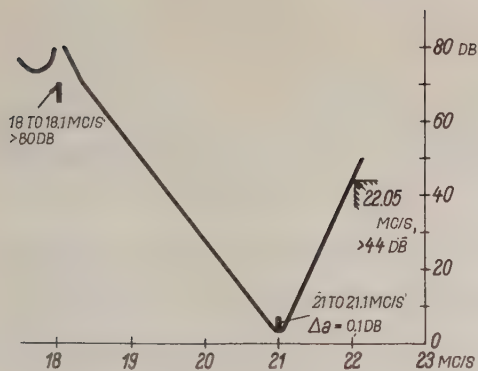


FIG. 8 ATTENUATION-VS-FREQUENCY CURVE OF THE BAND-PASS FILTER FOR  $f_{z1}$

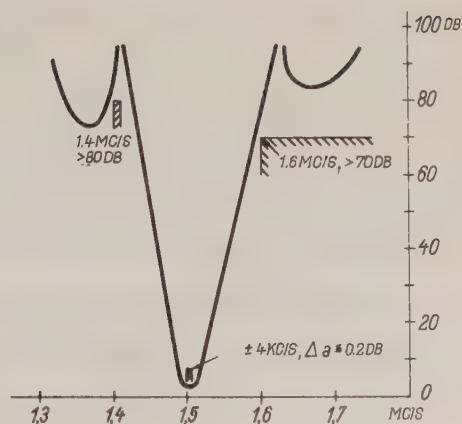
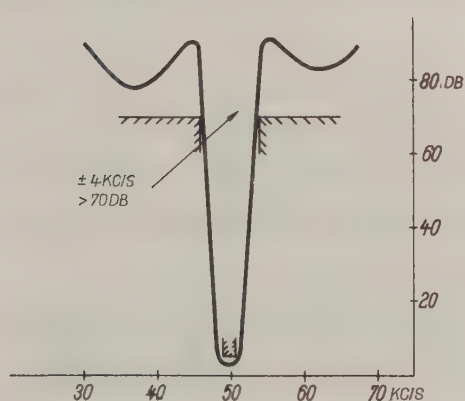
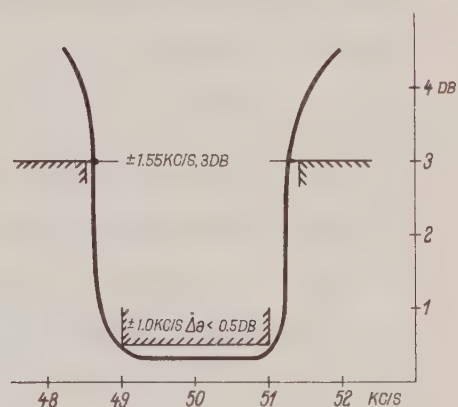


FIG. 9 ATTENUATION-VS-FREQUENCY CURVE OF THE BAND-PASS FILTER FOR  $f_{z2}$

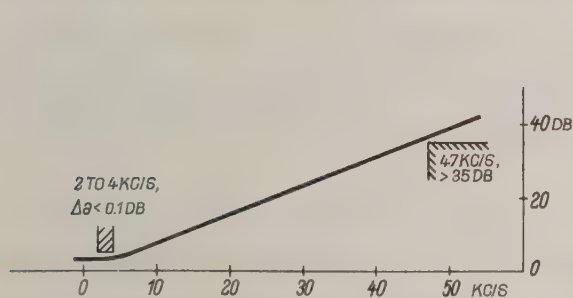


a. OVERALL CURVE

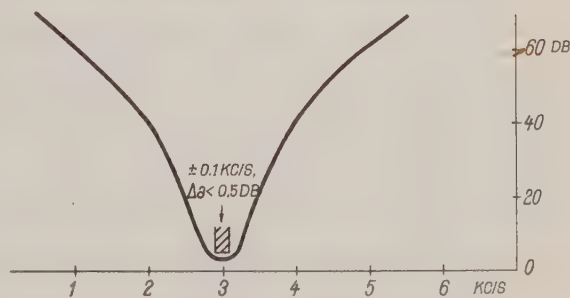


b. PASS BAND SHOWN ENLARGED

FIG. 10 ATTENUATION-VS-FREQUENCY CURVE OF THE BAND-PASS FILTER FOR  $f_{z3}$



a. 5-KC/S LOW-PASS FILTER



b. 3-KC/S BAND-PASS FILTER

FIG. 11 ATTENUATION-VS-FREQUENCY CURVE OF THE FILTERS FOR  $f_{z4}$

This modulator translates the 3rd intermediate frequency of  $f_{z3} = 50 \text{ kc/s}$  to the last IF of  $f_{z4} = 3 \text{ kc/s}$ . Crystal oscillator G4 supplies the carrier voltage of  $f_4 = 47 \text{ kc/s}$ .

Each of the oscillator units G3 and G4 uses one triode section of tube 6 (CCa). Their frequencies are stabilized by a crystal, their amplitude by a Germanium diode in the regenerative path.

The 4th modulator is followed by another 20-db (2-N) attenuator, which is also cut out of circuit by switch S7 in the positions of -30 and -20 db (-3 and -2 N). Along with the 10-db (1-N) attenuator, the attenuation is 30 db (3 N), which is reduced by 10, 20 or 30 db (1, 2 or 3 N) with S7 in accordance with the increase of sensitivity. The receiver can be adapted to the measuring problem on hand as regards residual distortion and inherent noise by means of the switched attenuators incorporated in addition to the input divider.

Switch S4 connects either a 5-kc/s low-pass filter or a 3-kc/s band-pass filter to the output of the attenuator (PASS BAND WIDTH). The 5-kc/s low-pass filter, brought into circuit in the position PASS BAND WIDTH 2 KC/S, suppresses the carrier leakage and the sum frequency of modulator Md4. The attenuation frequency response of the filters is shown in Fig.11.

The output amplifier following the filters consists of four amplifier stages which are voltage-degenerated in sets of two. The gain can be varied by about 6 db with the calibrating control in the 2nd degenerative path. The overall gain is about 52 db.

The indicator circuit is connected to the output of the final amplifier through the output switching-type jack " $\sim$ ". For rectification it contains two germanium diodes in a voltage doubler circuit. The charge and discharge time constants are so selected that the response to AC voltages is RMS (important in noise level measurements, for instance). In the models for power level measurements the corrective networks are also connected to the indicator circuit through  $S2^I$ .

The output voltage ( $f = 3 \text{ kc/s}$ ) can be taken from the output jacks " $\sim$ " for connecting a level tracer, for instance. This causes the detector circuit to be disconnected. The rectified output voltage can be taken from the output jack "-" to feed a recorder (current or voltage) or the Type Rel 3 B 942 scale spread device (see the Accessories Section).

## B. Additional Equipment

### 1. Probe Type Rel 3 B 938

The Type Rel 3 B 938 probe is available for high-impedance measurements directly at measuring points within a device. Its input impedance is about 1.6 meg shunted by 10 pf.

Nothing of the accuracy of the level meter is sacrificed when the probe is used as it can be calibrated along with the level meter. It receives its operating voltages from the level meter through a connecting jack. For a detailed description see the Full Information Folder Rel 3 B 938 En.

### 2. Reflectometer Bridge Type Rel 3 R 132 (30 kc/s to 15 mc/s)

The development and testing of communication equipment often require the reflection to be exactly determined as a function of frequency. The CF measuring setup can be expanded to cope with reflection coefficient measurements by means of the Type Rel 3 R 132 reflectometer bridge; such measurements can also be carried out by using sweep-frequency principles. For further details see the Full Information Folder Rel gesamt 3 R 132b.

### 3. Sweep Attachment Type Rel 3 W 933 and Level Tracer Type Rel 3 D 346

(Converting the level meter to a selective sweep receiver; see also the Description Rel gesamt 3 W 933 and Rel gesamt 3 D 346 En).

As outlined in the Application section (pages 1/2), the level meter is capable of receiving swept signals as well when automatically tuned from the level oscillator (synchronized tuning). Owing to its outstanding accuracy and the grid of coordinates electronically added to its display, the Type Rel 3 D 346 level tracer is particularly suitable as a recorder.

In special cases where complex-frequency signals are to be analyzed in terms of their frequencies (spectrometer), or for the examination of harmonics, the sweep attachment, otherwise connected to the level oscillator, can be directly connected to the level meter, which is then directly tuned across a selected frequency range. Again, the level tracer is used for recording. The oscillator unit of the level meter which is out of circuit in the respective case is available for generating frequency markers.

### 4. Transit Coupling Type Rel 3 B 940

In automatic synchronized tuning there are several outer conductors (at chassis potential) between the oscillator and the receiver, and these of

necessity fail to have the same electrical properties. The current  $J_1$  flowing through the input of the specimen (see the equivalent circuit in Fig.12) is therefore distributed to the outer conductors in proportion to the coupling resistances,  $R_{K1}$  to  $R_{K3}$ , for instance. The current  $J_1''$  will then generate an interfering voltage  $E_{st}$  in the lead to the specimen. When

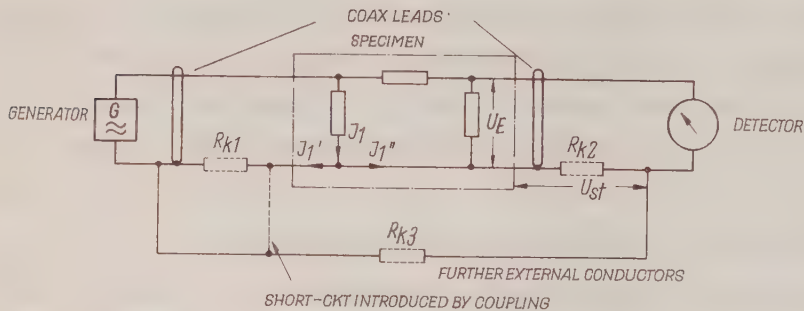


FIG.12 EQUIVALENT CIRCUIT FOR TRANSIT COUPLING

high attenuation values are to be measured, this interfering voltage is no longer negligibly low with respect to the voltage under test. By running all connecting lines through the transit coupling, the short-circuit shown in Fig.12 can be realized which guards the receiving circuit from the interfering current  $J_1''$ . This short-circuit will be the more effective, the nearer the transit coupling is to the specimen under test, i.e. the shorter the line connecting the coaxial-insertion coupler to the specimen compared to the other connecting lines.

#### 5. Scale Spread Device Type Rel 3 B 942

This accessory item, inserted into the indicator circuit of the level meter through the OUTPUT jacks, has an instrument scale covering  $\pm 1$  db ( $\pm 0.1$  N). Thus very low level variations down to 0.02 db (0.002 N) can be read off. This is of particular importance in the testing of the passbands of filters. For detailed information see the Full Information folder Rel gesamt 3 B 942 En.

#### 6. Measuring Pilot Levels

Owing to its exact frequency setting, high frequency stability, and sensitivity, the selective level meter is also suitable for measuring pilot levels. Checking and monitoring measurements on multichannel carrier systems

(such as the V960 system) can be performed during operation if the test pilots in the interband gaps are transmitted along with the message signals. The pilot level measurement gives a clear picture of the condition of the tested transmission section and thus enables the operators to carry out adjustments or repair work in due time.

The Type Rel 3 W 65 pilot level oscillator transmits further pilots of high frequency accuracy and amplitude stability over the transmission system to be examined in addition to the system pilots. For further details see the Full Information folder Rel gesamt 3 W 65 En.

## 7. Connecting Recorders

Recorders are connected to the output "-" of the level meter. Both high-impedance and low-impedance recorders are possible. The instrument of the level meter remains in operation in both cases and the measuring accuracy as well as the RMS response are retained if the calibration is repeated after the recorder has been connected and some further points have been observed (see IV. J. of the Instructions for Use).

IV. ACCESSORIES, DIMENSIONS, AND WEIGHTS

| Description                                       | Designation          | Dimensions<br>in mm | Approx.<br>Weight<br>in kg |
|---------------------------------------------------|----------------------|---------------------|----------------------------|
| <u>Selective level meter (10 kc/s to 17 mc/s)</u> |                      |                     |                            |
| +12 to +2 N, in cabinet . . . . .                 | Rel 3 D 335f1a       | 556x394x307         | 31                         |
| rack-mounting model . . . . .                     | Rel 3 D 335f1b       | 520x338x225         | 29                         |
| -110 to +20 db, in cabinet . . . . .              | Rel 3 D 335f2a       | 556x394x307         | 31                         |
| rack-mounting model . . . . .                     | Rel 3 D 335f2b       | 520x338x225         | 29                         |
| -100 to +30 dbm, in cabinet . . . . .             | Rel 3 D 335f3a       | 556x394x307         | 31                         |
| rack-mounting model . . . . .                     | Rel 3 D 335f3b       | 520x338x225         | 29                         |
| -11 to +3 Nm, in cabinet . . . . .                | Rel 3 D 335f4a       | 556x394x307         | 31                         |
| rack-mounting model . . . . .                     | Rel 3 D 335f4b       | 520x338x225         | 29                         |
| <u>Accessories:</u>                               |                      |                     |                            |
| 21 tubes . . . . .                                | CCa                  | -                   | -                          |
| 1 tube . . . . .                                  | E 91 AA              | -                   | -                          |
| 1 stabilizer tube . . . . .                       | 108 C 1              | -                   | -                          |
| 1 fuse link G, 1.0 amp for 220/240 v . . . .      | M 1,0 C DIN 41571    | -                   | -                          |
| 3 indicating lamps 6 v . . . . .                  | Fg 1p 62bc           | -                   | -                          |
| 1 spares bag<br>with                              |                      |                     |                            |
| 2 1-amp fuse links for 220/240 v . . . . .        | M 1,0 C DIN 41571    | -                   | -                          |
| 2 2-amp fuse links for 110/130 v . . . . .        | M 2,0 C DIN 41571    | -                   | -                          |
| 2 6-volt indicating lamps . . . . .               | Fg 1p 62bc           | -                   | -                          |
| 1 lamp extractor . . . . .                        | C44121-A9-C1         | -                   | -                          |
| <u>Optional:</u>                                  |                      |                     |                            |
| 1 level oscillator (10 kc/s to 17 mc/s) . .       | Rel 3 W 518f...      | 556x394x307         | 30                         |
| 1 pilot level oscillator (50 to 5608 kc/s).       | Rel 3 W 65...        | 558x392x520         | 28                         |
| 1 sweep attachment . . . . .                      | Rel 3 W 933...       | 558x256x410         | 20                         |
| 1 level tracer . . . . .                          | Rel 3 D 346...       | 558x392x510         | 36                         |
| 1 coaxial connecting cord 4/13 mm                 |                      |                     |                            |
| for Z = 75 Ω . . . . .                            | Rel 657 A 119c 2,4,5 | 500; 1000; 1500     | 0.2                        |
| for Z = 60 Ω . . . . .                            | Rel 657 A 120b 2,4,5 | 500; 1000; 1500     | 0.2                        |
| for the automatic tuning system                   |                      |                     |                            |
| 2(4*) coaxial connecting cords . . . . .          | Rel 657 A 119c2,...4 | 500,...1000         | 0.2                        |
| 1 transit coupling . . . . .                      | Rel 3 B 940          | 60x90x20            | 0.3                        |

\* If a transit coupling is used

| Description                                          | Designation       | Dimensions<br>in mm | Approx.<br>Weight<br>in kg |
|------------------------------------------------------|-------------------|---------------------|----------------------------|
| 1 coaxial connecting cord                            |                   |                     |                            |
| for $Z = 75 \Omega$ . . . . .                        | Rel 657 A 119c1   | 300                 | 0.2                        |
| for $Z = 60 \Omega$ . . . . .                        | Rel 657 A 120c1   | 300                 | 0.2                        |
| 1 adapter, e.g. 2.5/6 mm to 4/13 mm . . .            | Rel stv 113       | 76x22 dia.          | 0.3                        |
| 1 probe . . . . .                                    | Rel 3 B 938       | 140x20 dia.         | 0.3                        |
| 1 balancing transformer ( $Z = 150 \Omega$ ) . . . . | Rel 3 B 216       | 50x120x145          | 0.2                        |
| 1 balancing transformer ( $Z = 124 \Omega$ ) . . . . | Rel 3 B 218       | 50x120x145          | 0.2                        |
| 1 reflectometer bridge . . . . .                     | Rel 3 R 132       | 60x110x45           | 0.5                        |
| with                                                 |                   |                     |                            |
| 2 coaxial connecting cords                           |                   |                     |                            |
| 2.5/6 mm to 4/13 mm . . . . .                        | Rel 1tg 598a,...c | 300,...750          | 0.2                        |
| 1 scale-spread device . . . . .                      | Rel 3 B 942       | 158x125x70          | 1.5                        |
| Terminations $75 \Omega$ , $65 \Omega$ . . . . .     | Rel 3 B 333a,k    | 102x18 dia. each    | 0.1 each                   |







## I N S T R U C T I O N S F O R U S E

The level meters leave the factory adapted for connection to AC mains of 220 volts. If the device is to be operated from other AC mains (110, 130, 240 v), the chassis must be removed from the casing and the voltage adjuster S6 (at the upper side of the power supply subassembly near the power transformer) be switched to the available mains voltage. If this is 230 v, the link 1b-2b on the power transformer must be resoldered to 2b-3b, and the voltage adjuster S6 be switched to 240 v.

For a mains voltage of 110 or 130 v, the 1-amp fuse link must be replaced with a 2-amp one.

In accordance with the safety regulations of the "Verein Deutscher Elektrotechniker" (VDE) (Association of German Electrical Engineers), all mains-powered appliances whose touch potential may exceed 65 v with respect to ground when a fault occurs must be equipped with a terminal for a protective grounding lead. For this reason the device is provided with a power cord with a protective lead and a three-wire safety plug (Schuko plug) for insertion into a power outlet with protective ground connection (Schuko-outlet). The connecting facility and the cross section of the dead protective lead must equal those of the live conductors.

If the Schuko plug must be replaced by another (locally used) plug with a protective terminal, connect the three wires (red, gray, black) of the power cord as follows:

For non-polarized connector systems:

- connect the red wire to the protective terminal;
- the gray and black wires to the live terminals;

For polarized connector systems in mains with phase wire and neutral:

- connect the red wire to the protective terminal,
- the gray wire to the neutral terminal,
- and the black wire to the "phase" terminal.

Furthermore, the device is equipped with a special terminal ("  $\perp$  " on the front panel) connected to ground.

## II. ESTABLISHING THE MEASURING SETUP

The ventilation of the level meter and the built-in instruments have been laid out for an arrangement with the front panel vertical. The tops of the casings should not be covered to allow the warm air to escape. It is permissible to stack the devices (for example, the level meter onto the sweep attachment).

Annexed Fig.2 and the following show typical setups for various measuring problems. In order to avoid measuring errors, only the specified connecting cords should be used, especially if these are coaxial or doubly shielded (Types Rel 657 A 119..., B 120... see also Section IV. of the Description; Accessories, Dimensions, and Weights).

Interconnect the SYNCHR  $f_1$  and  $f_2$  jacks of the level oscillator and the level meter only with cords of  $Z = 75 \Omega$ , Type Rel 657 A 119... (in automatic synchronized tuning of the level meter), irrespective of the impedance of the specimen under test.

Like the level oscillator, the level meter provides jacks (SWEEP CKT A to D) for the connection of the Type Rel 3 W 933 sweep attachment. As in the case of the level oscillator the free oscillator unit is used as an auxiliary oscillator to provide frequency markers. Normally the coaxial jacks SWEEP CKT A,B and SWEEP CKT C,D must be linked by means of U-connectors because oscillator unit  $G_1$  or  $G_2$  is switched off when these connections are broken.

Whenever high attenuation values, such as the stop-band attenuations of filters, are to be measured with automatic tuning, it is advisable to interpose the Type Rel 3 B 940 transit coupling mentioned in section III.B.4. of the Description (annexed Fig.2). Make sure that the connection between the coupler and the input of the specimen under test is short, and that the combined length of the connection transit coupling/specimen/level meter is shorter than that from the transit coupling to the level oscillator.

### III. CALIBRATING AND SETTING

(see the annexed Fig.1, Controls)

Switch the devices on (scale lamps light up) and allow them to warm up for 15 to 30 minutes.

#### A. Frequency Calibration

Do not vary the position of CORR  $f_1$  (it is only meant to compensate for aging effects), see the Notes on Maintenance.

Split the synchronizing connections to the level oscillator while calibrating. Set the function switch S4 to TUNING WITH SPECTRUM LOCK-IN, n TIMES 100 KC/S, PASS BAND WIDTH 200 C/S, set the level switch S3 to "▼", set the tuning control  $f_1$  (megacycle scale) to 100 KC/S (within the range of the calibrating mark "▼"). The green LOCK-IN CHECK lamp SL3 must light up.

Set the fine control  $f_2$  (kilocycle scale) to the 0-KC/S line (calibrating mark "▼").

Align for maximum meter indication with CORR  $f_2$  (C110).

The frequency-tuning control  $f_2$  is now calibrated. The frequency scale  $f_1$  requires no retuning as it is derived from the 100-kc/s crystal generator.

When the green lamp of the illuminated  $f_2$  INDICATOR pushbutton goes out as the fine tuning control is rotated through its range, push this button, setting minimum deflection on the instrument with the adjusting screw  $f_2$  INDICATOR (R2).

#### B. Calibrating the Indication

Set the function switch S4, the range switch S3, and the tuning controls  $f_1$  and  $f_2$  as outlined in A. The LOCK-IN CHECK and  $f_2$  INDICATOR lamps must light up.

Set switch S7 to 0 db (0 N).

Tune for the calibrating frequency (100 kc/s) by slightly varying the fine tuning control  $f_2$  within the range of the calibrating mark (maximum meter deflection). Make the pointer deflect exactly to the right calibrating mark " ▼ " of the instrument scale with the control knob P (CALIBRATING " ▼ ").

If the measurements are to be extremely accurate, it is recommended, until the device has reached its thermal equilibrium, to check the calibration repeatedly during the first two hours after energization.

#### IV. MEASURING

##### A. Input Impedance and Termination of the Specimen

For customary impedance values the input impedance of the level meter can be matched to the specimen or to a high-impedance value " $\infty$ " with the Z/OHM switch S2. It is advisable to terminate the specimen at the level meter, if possible, by using a suitable built-in termination or by plugging a termination (such as a continued line) into the second parallel-connected input jack. This measure eliminates most of the influence of the leads. Operate switch S2 to " $\infty$ " if the termination is plugged in.

Always set the impedance switch to " $\infty$ " if the measurement is made on a carrier transmission system terminated as in actual operation. If longer leads are involved, it is advisable, and at frequencies over 1.5 mc/s absolutely necessary, to split the connection at the test point and to connect that part of the system which forms the termination for the measurement to the parallel jack of the input of the level meter. When built-in coupling circuits (test hybrids) are used, the specified impedance value must be set before the level meter is connected.

For high-impedance connection to the terminated specimen always select (switch S2) the high-impedance position that corresponds to the impedance value of the specimen when working with meters reading power levels.

##### B. Tuning and Measuring

Set the range switch S3 so that the anticipated receiving level can be read from the upper third of the instrument scale. Set a middle range if the receiving level is unknown.

Note: For all measurements where the full sensitivity is not required, operate switch S7 (LOW DISTORTION/LOW NOISE) to 0 DB/0 N LOW NOISE (signal-to-distortion ratio measurements are an exception, see section G.).

Set S4 first to CONTINUOUS TUNING (pass band width 2 kc/s), and rotate  $f_1$  slowly through its range on the frequency band in question until the instrument shows a deflection. Tune for maximum indication, also using the

tuning control  $f_2$ , if necessary. Adjust the sensitivity with S3 so that the indication is in the upper third of the scale. If the test frequency is to be determined exactly or if high stability of the tuning condition is required (e.g. for permanent supervision purposes), switch to spectrum-locked operation. To this end, set the function switch S4 to TUNING WITH SPECTRUM LOCK-IN, n TIMES 100 KC/S, BANDWIDTH 200 C/S OR 2 KC/S. Set the tuning control  $f_1$  to the 100-kc/s, line, which is directly below the test frequency, so that the green LOCK-IN CHECK lamp lights up. Then retune for maximum meter indication with the tuning control  $f_2$ . The frequency of the measured voltage equals the sum of the settings  $f_1 + f_2$ .

The output AC voltage (3 kc/s) proportional to the indication can be taken from the OUTPUT AC jacks. When a display unit or an oscilloscope is connected, for instance, the instrument will be switched off by insertion of the plug. At the OUTPUT jacks the rectified voltage is available for connection of a recorder (current or voltage). In this case the instrument is not disconnected when a plug is inserted.

### C. Pass Band Width

Switch S4 sets the level meter either for a pass band width of 2 kc/s or 200 c/s. In the position 2 KC/S, the pass band width between the 3-db down points is about the width of a 3.1-kc/s voice channel.

It is advisable to measure in the position PASS BAND WIDTH 200 C/S to separate closely adjacent frequencies and to suppress interfering voltages when the sensitivity of the instrument is utilized to the full.

At the measuring frequencies below 30 kc/s, the measurements must always be made with the pass band width of 200 c/s if the full sensitivity is to be used. The positions of -10 to -30 db of switch S7 should not be used in case of a pass band width of 2 kc/s (see also the following Section D.).

### D. Signal-to-Noise Ratio

Special applications, such as the presentation of curves on the screen of a level tracer or the increase in the relative measuring accuracy by means of scale spreading with the aid of the Type Rel 3 B 942 scale spread device, depend on an extremely high signal-to-noise ratio. It will be highest when

switch S7 is at 0 db. To avoid reading errors as far as possible, the positions of -10 to -30 db (-1 to -3 N) of switch S7 are illuminated. They should only be used if the higher sensitivity of the device is absolutely needed.

#### E. Measurements with Probe

The PROBE and TEST PROBE jacks are provided for the connection of the Type Rel 3 B 938 probe.

#### F. Synchronized Measurements

For synchronized measurements the frequency is only adjusted on the level oscillator, no tuning of the level meter being required.

The main and fine tuning controls ( $f_1$  and  $f_2$ ) can be operated synchronously either at the same time or separately, as required - both in continuous and spectrum-locked tuning operation.

To this end, establish the connections SYNCHR LEVEL OSCILLATOR/SYNCHR LEVEL METER. In order to avoid measuring errors, use the doubly shielded Type Rel 657 A 119 connecting cords ( $Z = 75 \Omega$ ). Use the Type Rel 3 B 940 transit coupling for measuring very high attenuations (see section III.B.4.).

##### Synchronization $f_1$

The interpolation oscillator  $f_2$  in the level meter works as it does in non-synchronized measurements and must be previously tuned with the fine tuning control  $f_2$ , so that the indication is a maximum. On the level meter the frequency is set with  $f_1$  alone.

##### Synchronization $f_2$

The auxiliary oscillator unit G2 (310 to 200 kc/s) of the level meter is replaced with that of the level oscillator when the connecting cord SYNCHR  $f_2$  is plugged in. The  $f_2$ -INDICATOR lamp must not go out; if it does, readjust R2 so that it lights up again. Minor frequency differences between the two devices must be offset especially if the measurement is to be made with a pass band width of 200 c/s.

Such a frequency difference is compensated for by making a first measurement without SYNCHR  $f_2$ , then connecting the SYNCHR  $f_2$ 's (level oscillator/level meter).

Adjust maximum pointer deflection on the level meter with CORR  $f_2$ . The indication must equal that without synchronization. If this alignment is insufficient, minor deviations can be additionally corrected with CORR  $f_2$  on the level oscillator. But since this readjustment will vary the frequency calibration, although only a little, it will be better to readjust the range of the trimmer CORR  $f_2$  with C109 in the interpolation oscillator of the level meter.

Further frequency settings with  $f_2$  on the level oscillator will automatically tune  $f_2$  of the level meter. When the level meter is to be used without synchronization  $f_2$  again, the calibration of the frequency scale  $f_2$  must be performed as outlined in section A. to secure an exact frequency determination.

#### Synchronization $f_1$ and $f_2$

Set maximum deflection on the instrument of the level meter with the trimmer CORR  $f_2$  after the two synchronization cords  $f_1$  and  $f_2$  have been plugged in and the specimen been connected or a direct connection has been established.

It is recommended to repeatedly check the setting CORR  $f_2$  of the level meter during the first two hours after the energization until the device has reached its normal equilibrium.

When the level meter is to be tuned manually again, recalibration of the  $f_2$  scale is required for exact frequency determination (see section A.).

#### G. Measuring High Signal-to-Distortion Ratios

A prerequisite for the measurement of signal-to-distortion ratios is that the residual distortion of the level meter is sufficiently low with respect to the signal-to-distortion ratio to be measured. It will be the lower, the lower the level of the fundamental at the input amplifier. When measuring signal-to-distortion ratios of  $\geq 50$  db (6 N), the following points must be observed to secure extremely high measuring accuracy:

Measuring the Level of the Fundamental: Operate switch S7 to 0 db (0 N). Vary the sensitivity with S3 until the deflection is well readable.

Measuring the Harmonic Level: For this measurement the sensitivity of the level meter must be increased with switch S7 (S7 to LOW DISTORTION -30 DB (-3 N)). The sensitivity is then further increased on the input divider. This increase must not exceed 10 db (2 N) between 10 kc/s and 30 kc/s, and be less than 20 db (3 N) above 30 kc/s.

The maximum increase in sensitivity for the harmonic measurement is thus 40 db or 5 N (10 kc/s to 30 kc/s) or 50 db (6 N) above 30 kc/s. Signal-to-distortion ratios up to 70 db (8 N) can be measured by including the instrument reading.

#### H. Measuring Narrow Filters with a Steep Attenuation/Frequency Characteristic

The success of such measurements depends on whether the measuring setup is essentially free from interference. So it is absolutely required that doubly shielded connecting lines (see annexed Fig. 1) be used. Be especially careful in performing the tuning correction  $f_2$ .

#### J. Connecting Recorders

##### 1. High-Impedance Recorders, $Z_i > 100$ kilohms

These are connected to the OUTPUT - jack (a-wire (in the middle) and c-wire (on top, chassis)). When the indication is 0 db, a voltage of +4 v is applied to the a-wire with respect to the c-wire.

##### 2. Low-Impedance Recorders, $Z_i < 10$ kilohms

These are connected to the OUTPUT - jack (a-wire (in the middle) and b-wire (bottom)). When the indication is 0 db, a current of about 80  $\mu$ a will flow from a to b.

##### 3. Recorders with $Z_i$ between 10 and 100 kilohms

If a recorder input of between 10 and 100 kilohms is single-ended or if its DC resistance with respect to chassis  $\leq 100$  kilohms, build out its input to 50 k $\Omega$  by means of a parallel or a series resistor. Connect the recorder to the OUTPUT - (wires a and c) and insert a dummy plug into b to cut out R20.

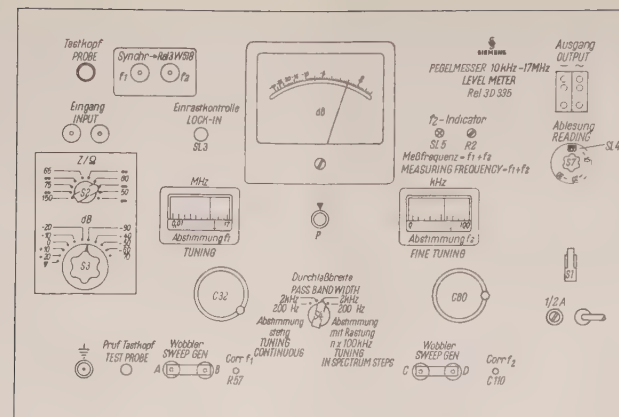
#### 4. Connecting the Scale Spread Device Type Rel 3 B 942a1a

It is connected to the OUTPUT - of the level meter through a shielded line, e.g. Type Rel ltg 546a-d.

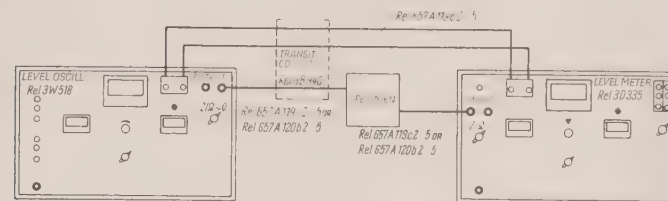
Adjust the deflection of the instrument of the scale spread device to  $\Delta p = 0 \text{ db (0 N)}$  with the fine control of the level meter. The instrument of the level meter will then also indicate 0 db (0 N). Minor corrections can be performed with the fine control of the scale spread device.

For more details see the Information Folder of the scale spread device Rel gesamt 3 B 942a1a En.





LEVEL METER, PANEL VIEW WITH CONTROL ELEMENTS

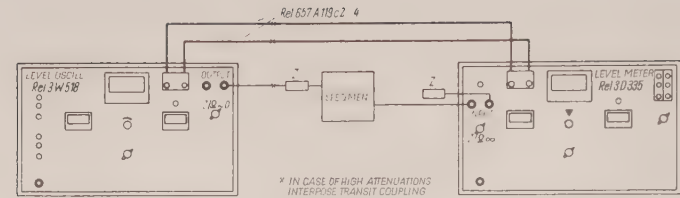


MEASURING SETUP FOR GENERAL MEASUREMENTS OF LEVEL, ATTENUATION, AND GAIN WITH AUTOMATIC SYNCHROTUNING OF THE LEVEL METER, WITH TRANSIT COUPLING (---) FOR MEASURING HIGH ATTENUATIONS.

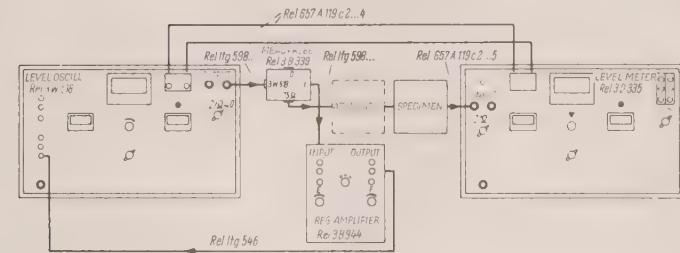
PANEL VIEW AND  
TYPICAL MEASURING SETUP

ANNEXED FIG. 1



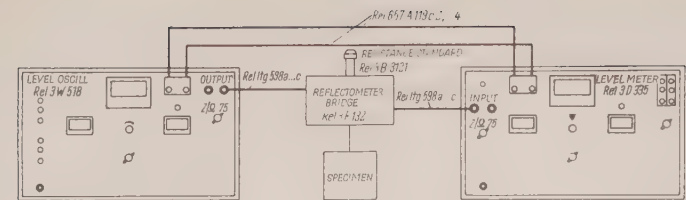


a. MEASUREMENTS OF LEVEL, ATTENUATION, AND GAIN WITH ARBITRARY IMPEDANCE VALUES. AUTOMATIC SYNCHROTUNING OF THE LEVEL METER

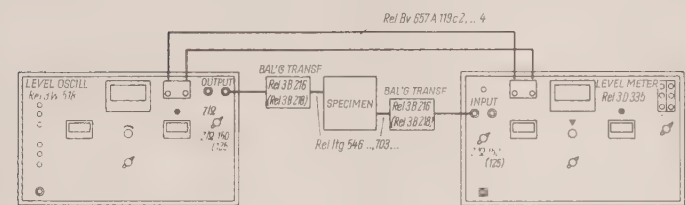


b. MEASURING WITH REGULATED TRANSMITTING LEVEL (VIA TEST PROBE AND REGULATING AMPLIFIER), PARTICULARLY SUITABLE FOR MEASUREMENTS OVER WIDE FREQUENCY RANGES.





a. MEASURING SIGNAL-TO-REFLECTION RATIOS  
(WITH REFLECTOMETER BRIDGE Rel 3 R 132)



b. MEASUREMENTS OF LEVEL, ATTENUATION, AND GAIN  
AT FREQUENCIES UP TO 1 MC/S AT BALANCED SPECIMENS  
(WITH BALANCING TRANSFORMER)







## NOTES ON MAINTENANCE

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The level meter is designed so that it will require no regular maintenance, routine supervision or testing of the tube currents.

But long operation is liable to vary the optimum settings due to aging effects. No specially trained personnel is required if the following instructions are carefully observed. The test points and aligning elements are arranged so that no further dismounting is required once the chassis has been removed from the casing.

### I. REPLACING A TUBE

The meter will perform properly only if the actual tube data comply with the specified characteristics.

If the meter is suspected of malfunctioning, check the tubes first, especially when the frequency scales or the level indication is out of order (see Sect.II,III).

As some of the characteristics of the tubes affect the alignment of the RF circuits, the tubes should be inserted at their original place after the examination.

## II. READJUSTING THE FREQUENCY SCALES

### A. Readjusting the Frequency Scale $f_1$ (in spectrum-locked operation)

Switch S4 to TUNING WITH SPECTRUM LOCK-IN.

If lock-in (checking lamp lights up) takes place off the 100-kc/s lines of the scale, rotate the drive from the low-frequency end to the high-frequency end and find out in which direction the scale deviates from the spectrum pattern (increase towards high frequencies). Then make the 15-mc/s calibrating line coincide with the graduation line. If the true lock-in point is above (below) the associated calibrating line, rotate CORR  $f_1$  (accessible on the front panel) counterclockwise (clockwise) until the green LOCK-IN CHECK lights up.

### B. Readjusting the Frequency Calibration $f_1$ CONTINUOUS

Remove the chassis from the casing and place it so that the bottom is accessible.

Operate S4 to CONTINUOUS TUNING and feed a signal of exactly 15 mc/s. Set the control TUNING  $f_1$  to the 15-mc/s line, and the FINE TUNING CONTROL  $f_2$  to 0 kc/s.

Align for maximum indication on the instrument with the potentiometer R82 (for its position see Rel ms 35 D 328 En, sheet 1).

### III. CHECKING THE LEVEL INDICATION

If the meter is suspected of wrong indications, check the indication itself and its frequency response, if necessary.

To this end, set the level meter to TUNING WITH SPECTRUM LOCK-IN, PASS BAND WIDTH 2 KC/S, input 75  $\Omega$ , tuning  $f_1$  1 MC/S, and the measuring range 0 DB (0 N).

Feed a signal of  $f = 1$  mc/s ( $p = 0$  db (0 N)) after having calibrated the level oscillator Type Rel 3 W 518. Tune the level meter for maximum deflection with  $f_2$  and set it for the calibrating mark on the instrument with the calibrating control P. Then set the range switch and the tuning controls  $f_1$  and  $f_2$  on the level meter to "▼". The instrument pointer must finally reach "▼"  $\pm 0.2$  db ( $\pm 0.02$  N) (the calibrating voltage of the level meter will then be in order).

If such is not the case or if the instrument reading can no longer be set with the calibrating control, check the tubes. If it is impossible to clear the fault, see the Fault Locating and Fault Eliminating sections.

### IV. REPLACING THE INDICATING LAMPS

All indicating lamps sit in bayonet sockets, from which they are removed by slightly pushing and simultaneously twisting the lamp extractor contained in the spares bag or a suitable section of insulating tubing. The spare lamps are also in the spares bag, which is fastened to the inside of the front panel.

The LOCK-IN CHECK lamp will be accessible after the cover lens has been withdrawn. The lamp in the illuminated  $F_2$  INDICATOR pushbutton can be replaced after the pushbutton has been removed, which is done by pushing it slightly and simultaneously twisting it counterclockwise.

The indicating lamp of switch S7 will be accessible after the chassis has been removed from the power supply subassembly.

The lamps of the film scales can be withdrawn with their sockets from the rear of the film cassette.





Stückliste • PARTS LIST

Schaltbilder • CIRCUIT DIAGRAMS

Stückliste  
PARTS LIST

|                                                 |      |
|-------------------------------------------------|------|
| Pegelmesser Rel 3 D 335f 1a-4b . . . . .        | 4.1  |
| LEVEL METER                                     |      |
| Netzteil Rel 35 D 331f 1a-2b . . . . .          | 4.3  |
| POWER SUPPLY UNIT                               |      |
| Empfänger Rel 35 D 340f 1a,2a . . . . .         | 4.9  |
| SUPERHETERODYNE UNIT                            |      |
| Meßfeld Rel 35 D 330f 1a-4a . . . . .           | 4.23 |
| MEASURING FIELD                                 |      |
| Oszillator-Baugruppe Rel 35 D 328f 1a . . . . . | 4.31 |
| OSCILLATOR SUBASSEMBLY                          |      |

Schaltbilder  
CIRCUIT DIAGRAMS

|                                |                                   |
|--------------------------------|-----------------------------------|
| Pegelmesser . . . . .          | Rel str 3 D 335f                  |
| LEVEL METER                    |                                   |
| Netzteil . . . . .             | Rel str 35 D 331f 1a,2a           |
| POWER SUPPLY UNIT              |                                   |
| Empfänger . . . . .            | Rel str 35 D 340f 1a,2a (2 Blatt) |
| SUPERHETERODYNE UNIT           |                                   |
| Meßfeld . . . . .              | Rel str 35 D 330f 1a,4a           |
| MEASURING FIELD                |                                   |
| Meßfeld . . . . .              | Rel str 35 D 330f 2a,3a           |
| MEASURING FIELD                |                                   |
| Oszillator-Baugruppe . . . . . | Rel str 35 D 328f 1a (2 Blatt)    |
| OSCILLATOR SUBASSEMBLY         |                                   |

Die Stückliste zählt im wesentlichen die elektrischen Bauteile auf, und zwar nicht nur mit ihren Bestellangaben, sondern auch mit ihren Hauptkennwerten. Die einzelnen Teile sind hier für jedes Gerät und seine Baugruppen entsprechend ihren Bezeichnungen auf den Stromläufen alphabetisch geordnet.

The Parts List essentially enumerates the electrical components, not only with their ordering data, but also with their principal parameters. For each device and its subassemblies the component parts are alphabetically ordered corresponding to their designations in the circuit diagrams.

# STÜCKLISTE

## Vorbemerkung

Unter Symbol stehen die in den Stromläufen verwendeten Abkürzungen für die Bauteile in alphabetischer und - soweit möglich - in numerischer Reihenfolge. Mit Stück ist die Anzahl der gleichen Bauteile innerhalb der Geräte oder der Baugruppe bezeichnet. In der Spalte Gegenstand sind außer dem Namen des Bauteils auch seine Hauptkennwerte angegeben. Mit der Bestellangabe ist das Bauteil durch einen Abkürzungs-Code oder eine Bauvorschrift eindeutig gekennzeichnet.

Es bedeuten:

bei einem Widerstand: 300 kΩ  $\pm 5\%$ ; 0,5 W  
 300 kΩ . . . . . Nennwert des Widerstandes  
 $\pm 5\%$  . . . . . Toleranz des Nennwiderstandes  
 0,5 W . . . . . Belastbarkeit bezogen auf Umgebungstemperatur 20°

bei einem Kondensator: 1000 pF  $\pm 20\%$ ; 125 V-  
 1000 pF . . . . . Nennwert der Kapazität (1 pF = 1  $\mu$ F =  $10^{-12}$  F)  
 $\pm 20\%$  . . . . . Toleranz der Nennkapazität  
 125 V- . . . . . zulässige Betriebsgleichspannung

bei einem Übertrager: Wicklg.I (1a,2a,3a) Wicklg.II (rtsw,gesw, rtgn,gegns<sup>+</sup>)  
 440 Wdg 0,1 CuL 75 Ω 720 Wdg HFL SS 60x0,03 35 Ω  
 228  $\mu$ H  $\pm 2\%$   
 Abgriff(2a):210 Wdg 1.Abgriff (gesw): 46 Wdg  
 2.Abgriff (rtgn): 190 Wdg

Wicklg.I (1a,2a,3a)  
 440 Wdg . . . . . 440 Windungen, Anfang Lötöse 1a, Ende 3a;  
 0,1 CuL . . . . . aus Kupferdraht (Cu); 0,1 mm Ø; lackisoliert (L)  
 75 Ω . . . . . Gleichstromwiderstand der Wicklung I  
 228  $\mu$ H . . . . . Induktivität  
 Abgriff(2a): 210 Wdg . . . . . Abgriff bei der 210.Wicklung, Lötöse 2a

Wicklg.II  
 HFL SS 60x0,03 . . . . . sinngemäß wie bei Wicklung I  
 Hochfrequenzlitze 2fach seidenumspinnen (SS),  
 aus Kupferdraht 60x0,03 mm Ø

bei einem Gleichrichter: 50 V/250 mA  
 50 V . . . . . Anschluß-Wechselspannung  
 250 mA . . . . . entnehmbarer Betriebsstrom

bei Halbleitern:  
 J<sub>D</sub> . . . . . Durchlaßstrom bei +1 V } Dioden  
 U<sub>Sp</sub> . . . . . Sperrspannung }  
 J<sub>Z</sub> . . . . . Zenerstrom } Zenerdioden  
 U<sub>Z</sub> . . . . . Zenerspannung }  
 r<sub>Z</sub> . . . . . Dynamischer Zener- }  
 Widerstand bei J<sub>Z</sub> }  
 R<sub>20</sub> . . . . . Widerstand bei 20°C z.B. von Heißeitern  
 TK . . . . . Temperaturkoeffizient

+ Farb-Kurzzeichen

|            |           |           |              |                    |
|------------|-----------|-----------|--------------|--------------------|
| bl = blau  | ge = gelb | gr = grau | sw = schwarz | rs = rosa          |
| br = braun | gn = grün | rt = rot  | ws = weiß    | rtsw = rot/schwarz |

PARTS LIST

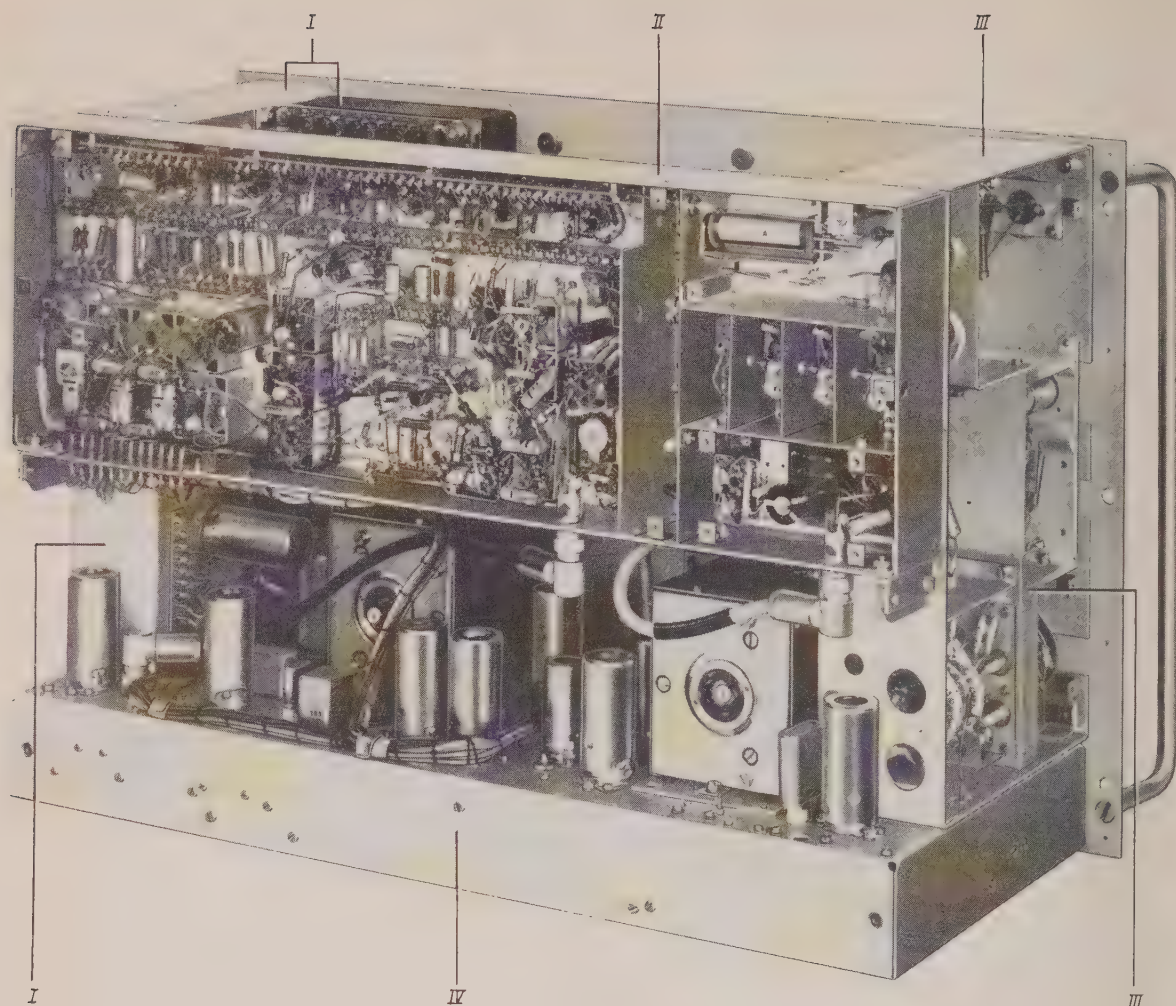
Introductory remark

The "SYMBOL" column shows the abbreviations used in the circuit diagrams in alphabetic and, to the extent possible, numerical order. "QTY" denotes the number of identical components within the devices or the subassembly. The "DESCRIPTION" column gives, apart from the designation of the components, its principal characteristic data. The "ORDERING DATA" column designates the component nonambiguously by an abbreviation code or a component specification.

There denotes, for instance

|                      |                                            |                                                                      |
|----------------------|--------------------------------------------|----------------------------------------------------------------------|
| with a resistor:     |                                            | 300 kΩ $\pm 5\%$ ; 0,5 W                                             |
| 300 kΩ               |                                            | Nominal value of the resistance                                      |
| $\pm 5\%$            |                                            | Tolerance of the nominal resistance                                  |
| 0,5 W                |                                            | Wattage rating, as referred to an ambient temperature of 20°C        |
| with a capacitor:    |                                            | 1000 pF $\pm 20\%$ ; 125 V-                                          |
| 1000 pF              |                                            | Nominal value of the capacitance (1 pF = 1 μF = 10 <sup>-12</sup> F) |
| $\pm 20\%$           |                                            | Tolerance of the nominal capacitance                                 |
| 125 V-               |                                            | Permissible DC operating voltage                                     |
| with a transformer:  |                                            | Wickl. I(1a,2a,3a)      Wicklg. II(rtsw,gesw, rtgn,gegns)+           |
| 440 Wdg              | 0,1 CuL 75 Ω                               | 720 Wdg HFL SS 60x0,03 35 Ω                                          |
| 228 μH $\pm 2\%$     |                                            | 1.Abgriff{gesw}: 46 Wdg                                              |
| Abgriff(2a): 210 Wdg |                                            | 2.Abgriff(rtgn): 190 Wdg                                             |
| Wickl. I(1a,2a,3a)   |                                            |                                                                      |
| 440 Wdg              |                                            | 440 turns, start soldering lug 1a, end 3a                            |
| 0,1 CuL              |                                            | of copper wire (Cu); 0.1 mm dia., enamelled (L)                      |
| 75 Ω                 |                                            | DC resistance of winding I                                           |
| 228 μH               |                                            | Inductance                                                           |
| Abgriff(2a): 210Wdg  |                                            | Tap at soldering lug 2a at the 210th turn                            |
| Wickl. II            |                                            | Analogously to winding I                                             |
| HFL SS 60x0,03       |                                            | RF copper Litz wire, with double silk covering, 60x0.03 mm dia.      |
| with a rectifier:    |                                            | 50 V/250 mA                                                          |
| 50 V                 |                                            | Primary AC voltage                                                   |
| 250 mA               |                                            | Available operating current                                          |
| with semiconductors: |                                            |                                                                      |
| J <sub>D</sub>       | Forward current with +1 v                  | } Diodes                                                             |
| U <sub>Sp</sub>      | Inverse voltage                            |                                                                      |
| J <sub>Z</sub>       | Zener current                              | } Zener diodes                                                       |
| U <sub>Z</sub>       | Zener voltage                              |                                                                      |
| r <sub>Z</sub>       | Dynamic Zener resistance at J <sub>Z</sub> |                                                                      |
| R <sub>20</sub>      | Resistance at 20°C, e.g., of thermistors   |                                                                      |
| TK                   | Temperature coefficient                    |                                                                      |

+Color symbols  
bl = blue    |ge = yellow    gr = gray    sw = black    rs       = pink  
br = brown    gn = green    rt = red    ws = white    rtsw    = red/black



- |                                                    |                  |
|----------------------------------------------------|------------------|
| I. Netzteil<br>POWER SUPPLY UNIT                   | Rel 35 D 331 ... |
| II. Empfänger<br>SUPERHETERODYNE UNIT              | Rel 35 D 340 ... |
| III. Meßfeld<br>MEASURING FIELD                    | Rel 35 D 330 ... |
| IV. Oszillator-Baugruppe<br>OSCILLATOR SUBASSEMBLY | Rel 35 D 328 ... |

Weitere Einzelheiten siehe    Rel ms 3 D 335 ...  
FOR MORE DETAILS SEE

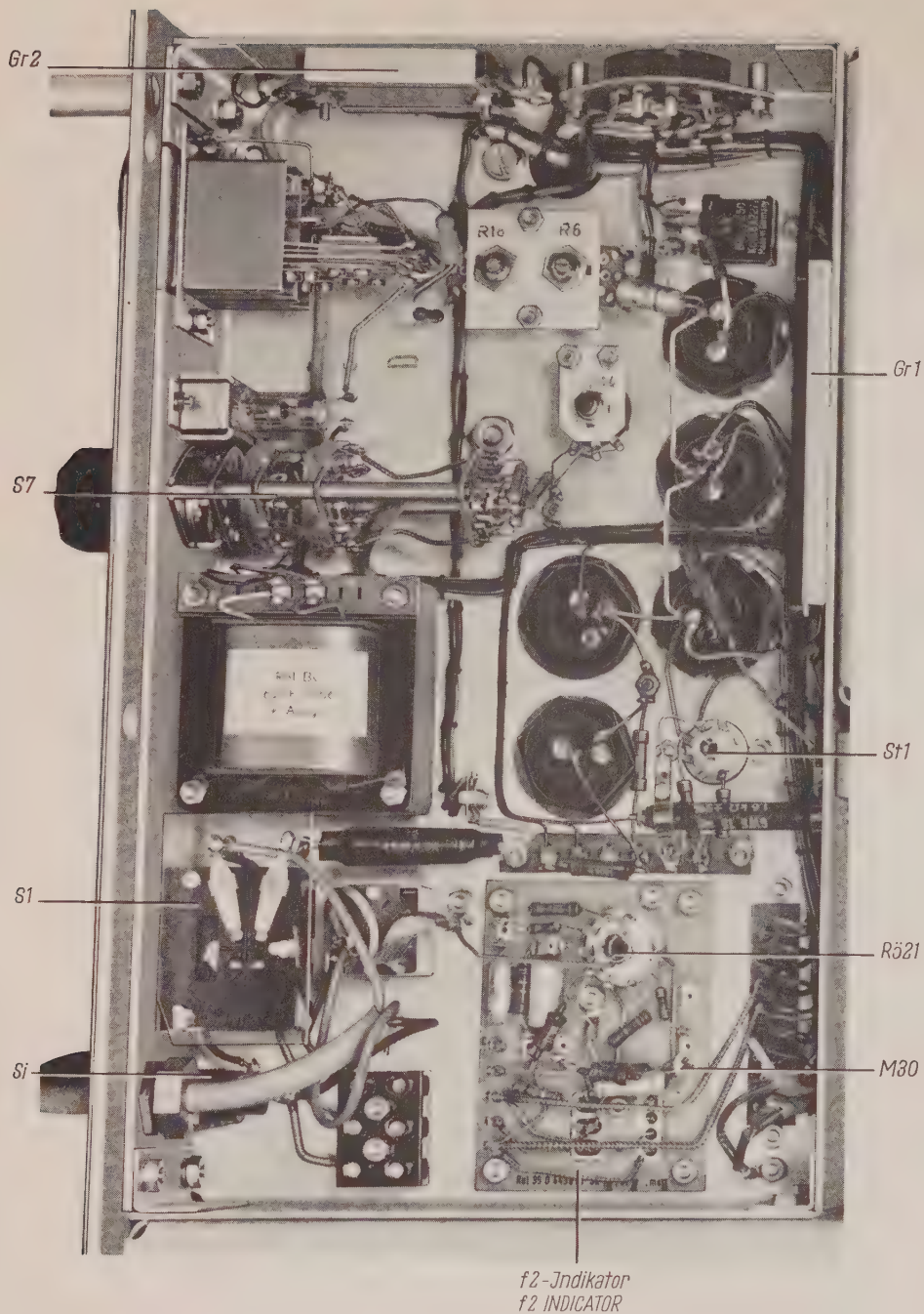
Rückansicht des geöffneten Pegelmessers  
REAR VIEW OF LEVEL METER (WITH COVER REMOVED)

Bild 1  
FIG. 1

| Symbol<br>SYMBOL | Stck<br>QTY | Gegenstand<br>DESCRIPTION                                                                       | Bestellangabe<br>ORDERING DATA | Seite<br>PAGE |
|------------------|-------------|-------------------------------------------------------------------------------------------------|--------------------------------|---------------|
|                  |             | Netzteil<br>POWER SUPPLY UNIT                                                                   |                                |               |
|                  | 1           | für Ausfg./FOR MODEL { 1a,4a<br>1b,4b                                                           | Rel 35 D 331f                  | 1a<br>1b      |
|                  | 1           | für Ausfg./FOR MODEL { 2a,3a<br>2b,3b                                                           | Rel 35 D 331f                  | 2a<br>2b      |
|                  |             | Empfänger<br>SUPERHETERODYNE UNIT                                                               |                                |               |
|                  | 1           | für Ausfg./FOR MODEL { 1a,1b<br>4a,4b                                                           | Rel 35 D 340f                  | 1a            |
|                  | 1           | für Ausfg./FOR MODEL { 2a,2b<br>3a,3b                                                           | Rel 35 D 340f                  | 2a            |
|                  |             | Meßfeld<br>MEASURING FIELD                                                                      |                                |               |
|                  | 1           | für Ausfg./FOR MODEL { 1a,1b<br>4a,4b                                                           | Rel 35 D 330f                  | 1a<br>4a      |
|                  | 1           | für Ausfg./FOR MODEL { 2a,2b<br>3a,3b                                                           | Rel 35 D 330f                  | 2a<br>3a      |
|                  | 1           | Oszillator<br>OSCILLATOR                                                                        | Rel 35 D 328f                  | 1a            |
| C 1              | 1           | MKH-Kondensator<br>MKH CAPACITOR<br>0,01µF ±20%; 300V-                                          | B32220-A3103-M                 |               |
| Gr 1÷4           | 4           | Germanium-Richtleiter<br>GERMANIUM CRYSTAL DIODE<br>J <sub>D</sub> = 5mA; U <sub>Sp</sub> = 40V | GD 1 E                         |               |
| J                | 1           | Instrument<br>INSTRUMENT<br>100µA 2000Ω<br>Äußerer Schließungswdst.25kΩ<br>EXTERNAL RESISTANCE  | Rel Bv 663 C 17...             |               |
|                  |             | mit/WITH                                                                                        |                                |               |
|                  |             | Skale für Ausführung<br>SCALE FOR MODEL                                                         |                                |               |
|                  | ...         | 1a,1b Np/N                                                                                      | ...                            | Pos.6         |
|                  | ...         | 2a,2b dB/DB                                                                                     | ...                            | Pos.7         |
|                  | ...         | 3a,3b dBm/DBM                                                                                   | ...                            | Pos.8         |
|                  | ...         | 4a,4b Npm/NM                                                                                    | ...                            | Pos.9         |

|                                                      |   |                                                       |                              |
|------------------------------------------------------|---|-------------------------------------------------------|------------------------------|
| Quarz<br>CRYSTAL                                     |   |                                                       |                              |
| Kr 1                                                 | 1 | 1,450 MHz / MC/S                                      | Rel Bv 673 W 162; f=1,45 MHz |
| Kr 2                                                 | 1 | 47,00 kHz / KC/S                                      | Rel Bv 673 A 2; f=47 kHz     |
| Kr 3                                                 | 1 | 100,00 kHz / KC/S                                     | Rel Bv 673 T 23; f=100 kHz   |
| Kr 4                                                 | 1 | 19,30 MHz / MC/S                                      | Rel Bv 673 W 131; f=19,3 MHz |
| L 11                                                 | 1 | UKW-Drossel<br>VHF REACTOR<br>40µH 0,3A               | B82501-A-A7                  |
| Anschlußleitung<br>CONNECTING CORD                   |   |                                                       |                              |
| Le 1                                                 | 1 | rot/RED { 250mm Länge                                 | Rel Bv 657 D 15g3            |
| Le 2                                                 | 1 | blau/BLE { 250 MM LENGTH                              | Rel Bv 657 D 15g4            |
| Le 3,4                                               | 2 | Koaxial-Verbindungsleitung<br>COAXIAL CONNECTING CORD | Rel mse 348, Tz 68           |
| Schicht-Drehwiderstand<br>LAYER-TYPE VAR RESISTOR    |   |                                                       |                              |
| P                                                    | 1 | 5kΩ +20/-30%; 0,4W                                    | 5 K lin Rel wd 152b          |
| R 2                                                  | 1 | 100kΩ +20/-30%; 0,1W                                  | 100 K lin Rel wd 165a        |
| T                                                    | 1 | Leuchtdrucktaste<br>LUMINOUS PUSHBUTTON               | Fg Bv 67a 254a 004           |
|                                                      | 1 | HF-Stecker 4/13<br>COAXIAL PLUG                       | Rel stp 40q                  |
| für Ausführung Rel 3 D 335f 1a,2a,3a,4a<br>FOR MODEL |   |                                                       |                              |
|                                                      | 1 | Netzanschlußleitung<br>POWER CORD                     | Rel ltg 702e                 |

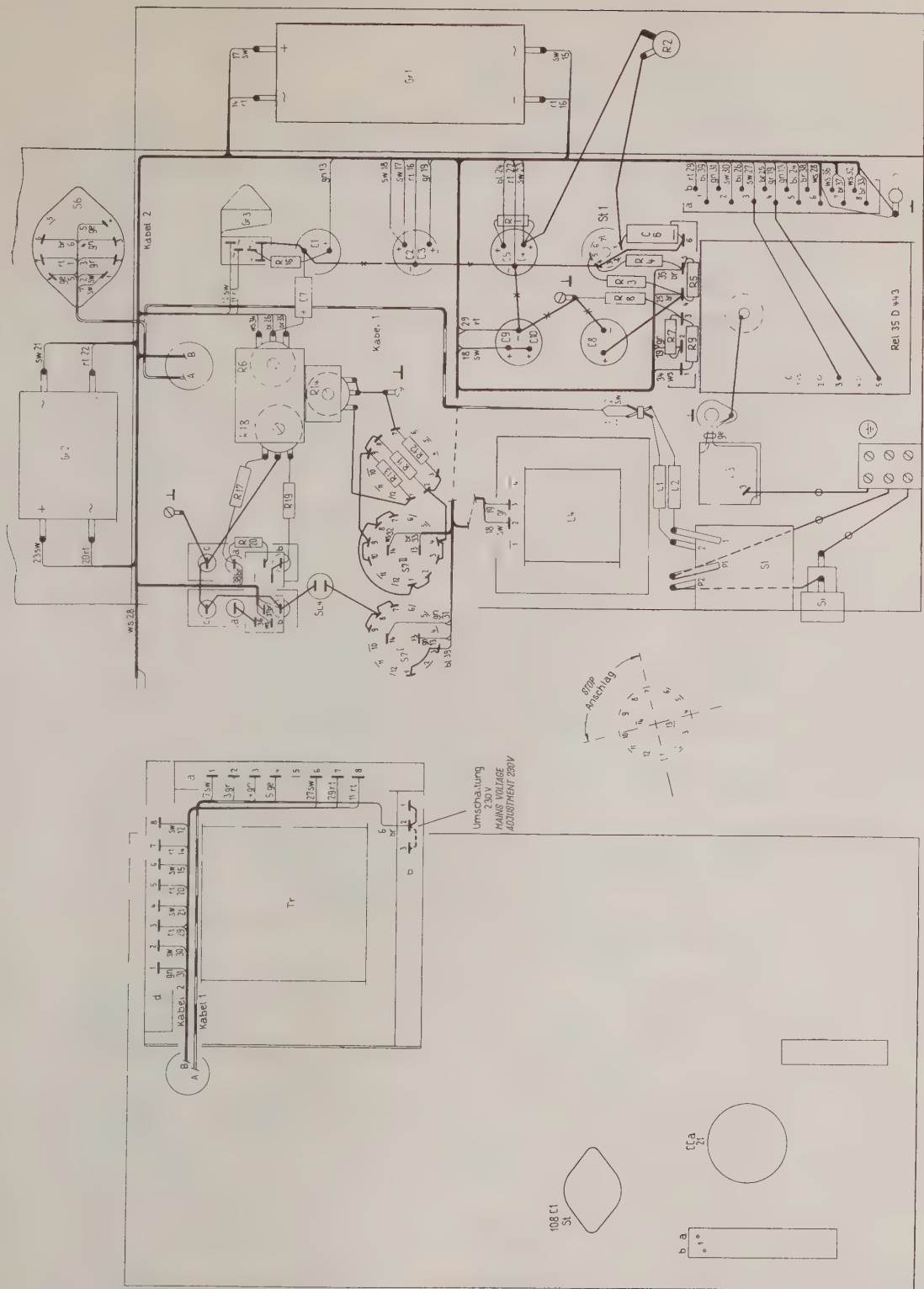
|        |   |                                                                                                    |                            |   |
|--------|---|----------------------------------------------------------------------------------------------------|----------------------------|---|
|        | 1 | f2-Indikator<br>F2 INDICATOR                                                                       | Rel 35 D 443f 1a           | 7 |
|        |   | Elektrolyt-Kondensator<br>ELECTROLYTIC CAPACITOR                                                   |                            |   |
| C 1    | 1 | 100 $\mu$ F +50/-20%; 70V-                                                                         | B41711-A8107-S             |   |
| C 7    | 1 | 2 $\mu$ F +50/-20%; 35V-                                                                           | B41951-A7205-S             |   |
| C 8    | 1 | 50 $\mu$ F +50/-10%; 250V-                                                                         | B43691-A2506-T             |   |
|        |   | Doppel-Elektrolyt-Kond.<br>DUAL ELECTROLYTIC CAP'R                                                 |                            |   |
| C 2/3  | 1 | 50+50 $\mu$ F +50/-10%; 250V-                                                                      | B43731-A2107-T             |   |
| C 4/5  | 1 | 32+32 $\mu$ F +50/-10%; 250V-                                                                      | B43731-A2646-T             |   |
| C 9/10 | 1 | 100+100 $\mu$ F +50/-10%; 250V-                                                                    | B43731-A2207-T             |   |
| C 6    | 1 | MKH-Kondensator<br>MKH CAPACITOR<br>0,1 $\mu$ F $\pm$ 20%; 300V-                                   | B32220-A3104-M             |   |
|        |   | Flachgleichrichter<br>FLAT-TYPE RECTIFIER                                                          |                            |   |
| Gr 1   | 1 | 125V / 350mA                                                                                       | V23201-F1137               |   |
| Gr 2   | 1 | 250V / 125mA                                                                                       | V23201-F1168               |   |
| Gr 3   | 1 | 30V / 250mA                                                                                        | V23201-F1208               |   |
| L 1,2  | 2 | UKW-Drossel<br>VHF REACTOR<br>45 $\mu$ H 1,5A                                                      | B82501-C-C12               |   |
| L 3    | 1 | Schalenkernspule<br>POT-CORE COIL<br>Wickl. Ia,Ib(ge,3)(ge,3)<br>7 Wdg 2x0,95 CuL<br>59-89 $\mu$ H | Rel Bv 622 N 3291          |   |
| L 4    | 1 | Drossel<br>REACTOR<br>Wickl. I (2,3)<br>2680 Wdg 0,26 CuL 100 $\Omega$<br>2,5H                     | Rel Bv 621 F 3056          |   |
|        |   | Schichtwiderstand<br>LAYER-TYPE RESISTOR                                                           |                            |   |
| R 1    | 1 | 1k $\Omega$ $\pm$ 5%; 0,5W                                                                         | B 51265 A 1 K 5/2          |   |
| R 3    | 1 | 250 $\Omega$ $\pm$ 5%; 0,33W                                                                       | B 51264 A 250 $\Omega$ 5/2 |   |
| R 4,8  | 2 | 20k $\Omega$ $\pm$ 5%; 0,33W                                                                       | B 51264 A 20 K 5/2         |   |
| R 5,7  | 2 | 160k $\Omega$ $\pm$ 5%; 0,33W                                                                      | B 51264 A 160 K 5/2        |   |
| R 9    | 1 | 50k $\Omega$ $\pm$ 5%; 0,33W                                                                       | B 51264 A 50 K 5/2         |   |



Weitere Einzelheiten siehe Rel ms 35 D 331  
FOR MORE DETAILS SEE

Netzteil im Pegelmesser  
POWER SUPPLY UNIT OF THE LEVEL METER

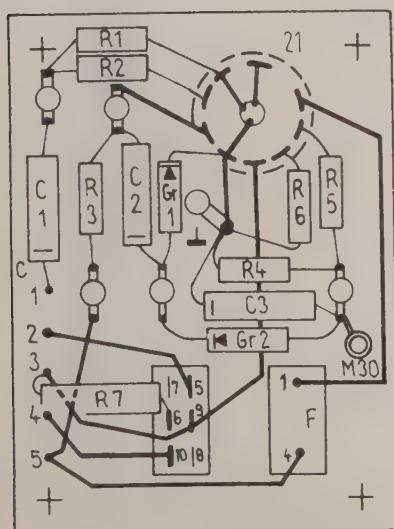
Bild 2  
FIG. 2

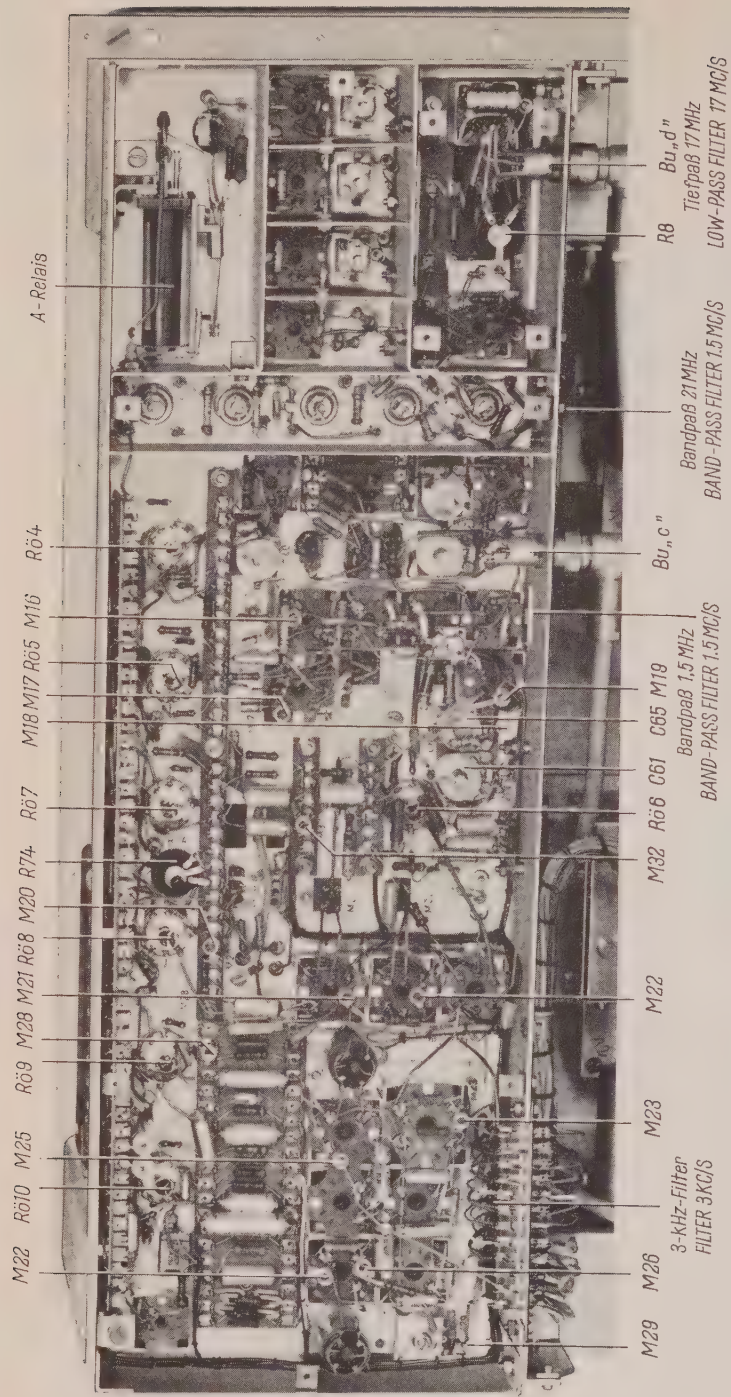


Netzteil Rel ms 35 D 331f1a (Ausgabe II)  
 POWER SUPPLY UNIT Rel ms 35 D 331f1a (ISSUE II)

|         |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                   |
|---------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| R 2     | 1   | Drahtwiderstand<br>WIRE-WOUND RESISTOR<br>1,6k $\Omega$ $\pm$ 5%; 15W                                                                                                                                                                                                                                                                                                                                                                                                                 | GWD15 1,6 K 5%<br>(Fa. Rosenthal) |
|         |     | Schicht-Drehwiderstand<br>LAYER-TYPE VAR RESISTOR                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |
| R 6     | 1   | 50k $\Omega$ +20/-30%; 0,1W                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 50 K lin Rel wd 165a              |
| R 14    | 1   | 100 $\Omega$ +20/-30%; 0,1W                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 100 $\Omega$ lin Rel wd 146a      |
| R 18    | 1   | 25k $\Omega$ +20/-30%; 0,1W                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 25 K lin Rel wd 165a              |
|         |     | Schichtwiderstand<br>LAYER-TYPE RESISTOR                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                   |
|         |     | für Ausführung / FOR MODEL 1a,1b (2a,2b <sup>+</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |
| R 11    | 1   | 2,18k $\Omega$ $\pm$ 1%; 0,1W                                                                                                                                                                                                                                                                                                                                                                                                                                                         | B 51263 A 2,18 K 1/0,5            |
|         | (1) | (2,97k $\Omega$ $\pm$ 1%; 0,1W <sup>+</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                         | (B 51263 A 2,97 K 1/0,5)          |
| R 12    | 1   | 788 $\Omega$ $\pm$ 1%; 0,1W                                                                                                                                                                                                                                                                                                                                                                                                                                                           | B 51263 A 788 $\Omega$ 1/0,5      |
|         | (1) | (733 $\Omega$ $\pm$ 1%; 0,1W <sup>+</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                           | (B 51263 A 733 $\Omega$ 1/0,5)    |
| R 13    | 1   | 720 $\Omega$ $\pm$ 1%; 0,1W                                                                                                                                                                                                                                                                                                                                                                                                                                                           | B 51263 A 720 $\Omega$ 1/0,5      |
|         | (1) | (670 $\Omega$ $\pm$ 1%; 0,1W <sup>+</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                           | (B 51263 A 670 $\Omega$ 1/0,5)    |
|         |     | für Ausführung / FOR MODEL 1a,1b,2a,2b                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |
| R 16    | 1   | 10 $\Omega$ $\pm$ 5%; 0,25W                                                                                                                                                                                                                                                                                                                                                                                                                                                           | B 51263 A 10 $\Omega$ 5/2         |
| R 17,19 | 2   | 40k $\Omega$ $\pm$ 2%; 0,25W                                                                                                                                                                                                                                                                                                                                                                                                                                                          | B 51263 A 40 K 2/2                |
| R 20    | 1   | 2,5k $\Omega$ $\pm$ 2%; 0,25W                                                                                                                                                                                                                                                                                                                                                                                                                                                         | B 51263 A 2,5 K 2/2               |
| S 1     | 1   | Netzschalter 250V / 2A<br>POWER SWITCH                                                                                                                                                                                                                                                                                                                                                                                                                                                | Rel sch 171a                      |
| S 6     | 1   | Spannungswähler<br>VOLTAGE ADJUSTER                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Rel sch 268a                      |
| S 7     | 1   | Kleindrehschalter<br>MIDGET ROTARY SWITCH                                                                                                                                                                                                                                                                                                                                                                                                                                             | Rel sch 332b Form C               |
| Tr      | 1   | Netzübertrager<br>POWER TRANSFORMER<br><br>Wickl. I (5a,3b,4a)<br>63 Wdg 0,55 CuL 0,8 $\Omega$<br>Abgriff (3b): 31 Wdg<br><br>Wickl. II/III(4a,2a)(3a,1a)<br>345 Wdg 0,45 CuL 6,5 $\Omega$ /7 $\Omega$<br><br>Wickl. IV (7d,6d)<br>353 Wdg 0,34 CuL 14 $\Omega$<br><br>Wickl. V (5d,4d)<br>590 Wdg 0,17 CuL 100 $\Omega$<br><br>Wickl. VI/VII(6a,3d)(7a,1d,2d)<br>22 Wdg 2x0,80 CuL paral. 1,40CuL<br>Abgriff (1d): 17 Wdg<br><br>Wickl. VIII (8a,8d)<br>68 Wdg 0,50 CuL 1,7 $\Omega$ | Rel Bv 621 L 3087                 |
|         | 1   | Buchseneinheit<br>JACK ASSEMBLY                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Rel Bv 654 B 53                   |

|        |   |                                                                                                |                            |
|--------|---|------------------------------------------------------------------------------------------------|----------------------------|
| C 1    | 1 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>2000pF $\pm 2,5\%$ ; 125V-                         | B31141-A1202-H             |
|        |   | MKH-Kondensator<br>MKH CAPACITOR                                                               |                            |
| C 2    | 1 | 0,047 $\mu$ F $\pm 20\%$ ; 300V-                                                               | B32220-A3473-M             |
| C 3    | 1 | 0,022 $\mu$ F $\pm 20\%$ ; 300V-                                                               | B32220-A3223-M             |
| Gr 1,2 | 2 | Germanium-Richtleiter<br>GERMANIUM CRYSTAL DIODE<br>$J_D = 5\text{mA}$ ; $U_{Sp} = 40\text{V}$ | GD 1 E                     |
|        |   | Schichtwiderstand<br>LAYER-TYPE RESISTOR                                                       |                            |
| R 1    | 1 | 500k $\Omega$ $\pm 5\%$ ; 0,25W                                                                | B 51263 A 500 K 5/2        |
| R 2,5  | 2 | 40 $\Omega$ $\pm 5\%$ ; 0,15W                                                                  | B 51263 A 40 $\Omega$ 5/2  |
| R 3    | 1 | 50k $\Omega$ $\pm 5\%$ ; 0,25W                                                                 | B 51263 A 50 K 5/2         |
| R 4    | 1 | 100k $\Omega$ $\pm 5\%$ ; 0,25W                                                                | B 51263 A 100 K 5/2        |
| R 6    | 1 | 160 $\Omega$ $\pm 5\%$ ; 0,25W                                                                 | B 51263 A 160 $\Omega$ 5/2 |
| R 7    | 1 | 1M $\Omega$ $\pm 5\%$ ; 0,25W                                                                  | B 51263 A 1 M 5/2          |
| F      | 1 | Kammrelais<br>CRADLE RELAY<br>7700 Wdg 0,06 CuL 1250 $\Omega$                                  | T rls 162a T Bv 65422/121d |





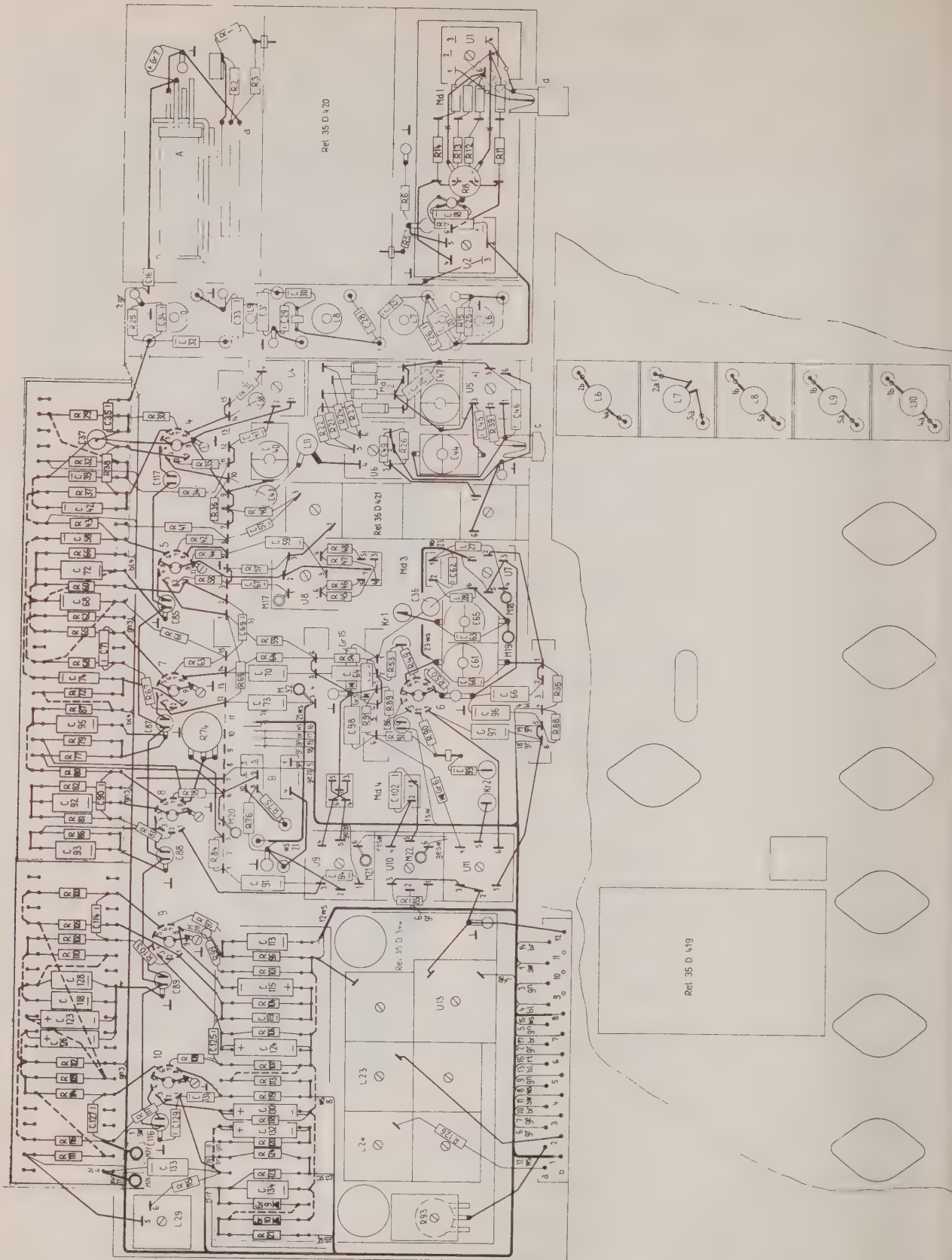
Empfänger im Pegelmesser  
SUPERHETERODYNE UNIT OF THE LEVEL METER

Weitere Einzelheiten siehe Rel ms 35 D 340  
FOR MORE DETAILS SEE

Bild 3  
FIG. 3

|   |                                              |                  |    |
|---|----------------------------------------------|------------------|----|
| 1 | Tiefpaß 17 MHz<br>LOW-PASS FILTER 17 MC/S    | Rel 35 D 420f 1a | 17 |
| 1 | Bandpaß 1,5 MHz<br>BAND-PASS FILTER 1.5 MC/S | Rel 35 D 421f 1a | 19 |
| 1 | Bandpaß 50 kHz<br>BAND-PASS FILTER 50 KC/S   | Rel 35 D 419f 1a | 20 |
| 1 | 3-kHz-Filter<br>3-KC/S FILTER                | Rel 35 D 344f 1a | 21 |

|            |   |                                                                                                                    |                       |
|------------|---|--------------------------------------------------------------------------------------------------------------------|-----------------------|
| C 16       | 1 | Keramik-Durchführungskond.<br>CERAMIC LEAD-THROUGH CAP'R<br>5000pF +30/-20%; 500V-                                 | B37480-A5502-R000     |
| C 18       | 1 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>200pF $\pm 10\%$ ; 500V-                                               | B 38223 N470 G 200 K  |
| C 20       | 1 | Lufttrimmer<br>AIR-DIELECTRIC TRIMMER<br>1,9-11pF +15%; 250V-                                                      | Rel ko 131d           |
| C 22       | 1 | MKL-Kondensator<br>MKL CAPACITOR<br>0,47 $\mu$ F $\pm 20\%$ ; 63V-<br><br>Keramik-Kondensator<br>CERAMIC CAPACITOR | B32110-D9474-M        |
| C 24       | 1 | 20pF $\pm 5\%$ ; 500V-                                                                                             | B 38223 N075 C 20 J   |
| C 26       | 1 | 10pF $\pm 0,25pF$ ; 500V-<br><br>Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR                                          | B 38223 N075 C 10 C   |
| C 25       | 1 | 215pF $\pm 1\%$ ; 125V-                                                                                            | B31140-A1211-F500     |
| C 27       | 1 | 159pF $\pm 1\%$ ; 125V-                                                                                            | B31140-A1151-F900     |
| C 29       | 1 | 120pF $\pm 1\%$ ; 125V-<br><br>Keramik-Kondensator<br>CERAMIC CAPACITOR                                            | B31140-A1121-F        |
| C 28       | 1 | 51pF $\pm 1\%$ ; 500V-                                                                                             | B 38223 N075 J 51 F   |
| C 30       | 1 | 13,9pF $\pm 2\%$ ; 500V-                                                                                           | B 38223 N075 C 13,9 G |
| C 31       | 1 | 63,2pF $\pm 1\%$ ; 500V-                                                                                           | B 38223 N075 E 63,2 F |
| C 32       | 1 | 5pF $\pm 0,25pF$ ; 500V-                                                                                           | B 38215 N075 A 5 C    |
| C 33       | 1 | 73pF $\pm 1\%$ ; 500V-                                                                                             | B 38223 N075 E 73 F   |
| C 34       | 1 | 15pF $\pm 2\%$ ; 500V-                                                                                             | B 38223 N075 C 15 G   |
| C 35<br>41 | 2 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>200pF $\pm 5\%$ ; 125V-                                                | B31140-A1201-J        |



Empfänger Rel ms 35 D 340f 1a, 2a (Ausgabe I)  
 RECEIVER Rel ms 35 D 340f 1a, 2a (ISSUE I)

|                                       |   |                                                                                      |                     |
|---------------------------------------|---|--------------------------------------------------------------------------------------|---------------------|
| C 36,38<br>43                         | 3 | Keramik-Scheibenkondensator<br>CERAMIC DISC-TYPE CAPACITOR<br>2000pF +30/-20%; 500V- | B 37638 L 2000 R    |
| C 37                                  | 1 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>2pF $\pm 0,25$ pF; 500V-                 | B 38215 N075 A 2 C  |
| C 39<br>59                            | 2 | MKH-Kondensator<br>MKH CAPACITOR<br>0,01 $\mu$ F $\pm 20\%$ ; 300V-                  | B32220-A3103-M      |
| C 40<br>65                            | 2 | Lufttrimmer<br>AIR-DIELECTRIC TRIMMER<br>1,7-19pF +15%; 250V-                        | Rel ko 130a         |
| C 42,58<br>64,66,68<br>70,74<br>91,92 | 9 | MKH-Kondensator<br>MKH CAPACITOR<br>0,047 $\mu$ F $\pm 20\%$ ; 300V-                 | B32220-A3473-M      |
| C 44,47<br>61                         | 3 | Lufttrimmer<br>AIR-DIELECTRIC TRIMMER<br>3,5-54pF +15%; 250V-                        | Rel ko 130d         |
|                                       |   | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR                                             |                     |
| C 45                                  | 1 | 60pF $\pm 2\%$ ; 125V-                                                               | B31140-A1600-G      |
| C 46,57<br>60,62,99                   | 5 | 100pF $\pm 2\%$ ; 125V-                                                              | B31140-A1101-G      |
| C 49                                  | 1 | 80pF $\pm 2\%$ ; 125V-                                                               | B31140-A1800-G      |
| C 63                                  | 1 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>20pF $\pm 1\%$ ; 500V-                   | B 38223 N075 C 20 F |
| C 67,69,71<br>90                      | 4 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>500pF $\pm 5\%$ ; 125V-                  | B31140-A1501-J      |
| C 72<br>95,96<br>118<br>128,134       | 6 | MKH-Kondensator<br>MKH CAPACITOR<br>0,1 $\mu$ F $\pm 20\%$ ; 300V-                   | B32220-A3104-M      |
| C 73                                  | 1 | MKL-Kondensator<br>MKL CAPACITOR<br>0,33 $\mu$ F $\pm 20\%$ ; 63V-                   | B32110-D9334-M      |
| C 85-89<br>116,117                    | 7 | Keramik-Bypaß Kondensator<br>CERAMIC BYPASS CAPACITOR<br>2500pF +30/-20%; 350V-      | B37070-A3252-R      |
| C 93,98                               | 2 | MKL-Kondensator<br>MKL CAPACITOR<br>0,1 $\mu$ F $\pm 20\%$ ; 100V-                   | B32110-C0104-M      |

|                      |   |                                                                                                |                   |
|----------------------|---|------------------------------------------------------------------------------------------------|-------------------|
|                      |   | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR                                                       |                   |
| C 94<br>119,129      | 3 | 1000pF $\pm 5\%$ ; 125V-                                                                       | B31140-A1102-J    |
| C 97                 | 1 | 3000pF $\pm 1\%$ ; 125V-                                                                       | B31141-A1302-F    |
| C 102                | 1 | MKH-Kondensator<br>MKH CAPACITOR<br>0,022 $\mu$ F $\pm 20\%$ ; 300V-                           | B32220-A3223-M    |
| C 113,114<br>125,127 | 4 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>5000pF $\pm 5\%$ ; 125V-                           | B31141-A1502-J    |
|                      |   | Elektrolyt-Kondensator<br>ELECTROLYTIC CAPACITOR                                               |                   |
| C 115                | 1 | 1 $\mu$ F +50/-10%; 150V-                                                                      | B43711-A1105-T    |
| C 123,126<br>132     | 3 | 4 $\mu$ F +50/-10%; 150V-                                                                      | B43711-A1405-T    |
| C 124,130            | 2 | 10 $\mu$ F +50/-20%; 35V-                                                                      | B41951-A7106-S    |
| C 131                | 1 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>250pF $\pm 5\%$ ; 125V-                            | B31140-A1251-J    |
| C 133                | 1 | MKH-Kondensator<br>MKH CAPACITOR<br>0,27 $\mu$ F $\pm 20\%$ ; 300V-                            | B32231-A3274-M    |
| Gr 5,6               | 2 | Germanium-Richtleiter<br>GERMANIUM CRYSTAL DIODE<br>$J_D = 3\text{mA}$ ; $U_{Sp} = 40\text{V}$ | GD 4 E            |
| Gr 7                 | 1 | Zwerggleichrichter<br>MINIATURE RECTIFIER<br>25V / 5mA                                         | V23201-H0441      |
|                      |   | Germanium-Richtleiter<br>GERMANIUM CRYSTAL DIODE                                               |                   |
| Gr 9,10              | 2 | $J_D = 3\text{mA}$ ; $U_{Sp} = 100\text{V}$                                                    | GD 3 E            |
| Gr 15                | 1 | $J_D = 5\text{mA}$ ; $U_{Sp} = 40\text{V}$                                                     | GD 1 E            |
| L 6                  | 1 | HF-Spule<br>RF COIL<br>Wickl. I (2b,4a)<br>3 1/2 Mag 1,0 CuL<br>0,24 $\mu$ H $\pm 5\%$         | Rel Bv 623 A 3189 |

|         |   |                                                                                                                                                                                                        |                         |
|---------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
|         |   | HF-Spule<br>RF COIL                                                                                                                                                                                    |                         |
| L 7     | 1 | Wickl. I (2a,5a)<br>5 Wdg 1,0 CuL<br>0,38µH $\pm 5\%$                                                                                                                                                  | Rel Bv 623 A 3190       |
| L 8,9   | 2 | Wickl. I (1b,5a)<br>12 Wdg 1,0 CuL<br>1,75µH                                                                                                                                                           | Rel Bv 623 A 3192       |
| L 10    | 1 | Wickl. I (1b,4a)<br>12 Wdg 0,60 CuL<br>2,1µH $\pm 5\%$                                                                                                                                                 | Rel Bv 623 A 3287       |
| L 11    | 1 | Wickl. I<br>20 Wdg 0,40 CuL<br>1,0-1,5µH                                                                                                                                                               | Rel Bv 623 A 3188       |
| L 27,28 | 2 | UKW-Drossel<br>VHF REACTOR<br>12µH 0,3A                                                                                                                                                                | B82501-D-A16            |
| L 29    | 1 | HF-Spule<br>RF COIL<br>Wickl. I (5,6)<br>1100 Wdg 0,10 CuL 92Ω                                                                                                                                         | Rel Bv 623 N 3299       |
| Md 1,2  | 2 | Richtleiter-Quartett<br>CRYSTAL DIODE QUAD<br><br>mit/WITH<br><br>Gr 1-4, 11-14<br>J <sub>D</sub> = 6mA; U <sub>Sp</sub> = 15V                                                                         | Rel Bv 672 R 126        |
| Md 3,4  | 2 | Richtleiter-Modulator<br>CRYSTAL DIODE MODULATOR<br>J <sub>D</sub> = 5-15mA; U <sub>Sp</sub> = 25V<br><br>Schichtwiderstand<br>LAYER-TYPE RESISTOR<br><br>für Ausführung Rel 35 D 340f 1a<br>FOR MCDEL | Rel Bv 672 R 21         |
| R 1     | 1 | 554Ω $\pm 0,5\%$ ; 0,15W                                                                                                                                                                               | B 51264 A 554 Ω 0,5/0,5 |
| R 3     | 1 | 316Ω $\pm 0,5\%$ ; 0,15W                                                                                                                                                                               | B 51264 A 316 Ω 0,5/0,5 |
|         |   | für Ausführung Rel 35 D 340f 2a<br>FOR MCDEL                                                                                                                                                           |                         |
| R 1     | 1 | 630Ω $\pm 0,5\%$ ; 0,15W                                                                                                                                                                               | B 51264 A 630 Ω 0,5/0,5 |
| R 3     | 1 | 292Ω $\pm 0,5\%$ ; 0,15W                                                                                                                                                                               | B 51264 A 292 Ω 0,5/0,5 |
|         |   | für Ausführung Rel 35 D 340f 1a,2a<br>FOR MCDEL                                                                                                                                                        |                         |
| R 2,15  | 2 | 1kΩ $\pm 5\%$ ; 0,25W                                                                                                                                                                                  | B 51263 A 1 k Ω 5/2     |

Schichtwiderstand  
LAYER-TYPE RESISTOR

für Ausführung Rel 35 D 340f 1a,2a  
FOR MODEL

|                                                               |    |                                                                              |                       |
|---------------------------------------------------------------|----|------------------------------------------------------------------------------|-----------------------|
| R 5<br>11-14<br>21-24                                         | 9  | 100Ω $\pm 1\%$ ; 0,1W                                                        | B 51263 A 100 Ω 1/0,5 |
| R 6                                                           | 1  | 150Ω $\pm 2\%$ ; 0,25W                                                       | B 51263 A 150 Ω 2/2   |
| R 7,44,64<br>86,120                                           | 5  | 3kΩ $\pm 5\%$ ; 0,25W                                                        | B 51263 A 3 K 5/2     |
| R 8                                                           | 1  | Schicht-Drehwiderstand<br>LAYER-TYPE VAR RESISTOR<br>500Ω $+20/-30\%$ ; 0,1W | 500 Ω lin Rel wd 146b |
|                                                               |    | Schichtwiderstand<br>LAYER-TYPE RESISTOR                                     |                       |
| R 25                                                          | 1  | 4kΩ $\pm 1\%$ ; 0,1W                                                         | B 51263 A 4 K 1/0,5   |
| R 26<br>31,36<br>53,69<br>111,121                             | 7  | 2kΩ $\pm 5\%$ ; 0,25W                                                        | B 51263 A 2 K 5/2     |
| R 29<br>34<br>54,57<br>61,68<br>81<br>91,96<br>102,107,116    | 12 | 500kΩ $\pm 5\%$ ; 0,25W                                                      | B 51263 A 500 K 5/2   |
| R 30,35<br>42,49<br>58<br>63,67<br>83<br>90,97<br>103,108,117 | 13 | 40Ω $\pm 5\%$ ; 0,15W                                                        | B 51262 A 40 Ω 5/2    |
| R 32,62<br>82                                                 | 3  | 20kΩ $\pm 5\%$ ; 0,25W                                                       | B 51263 A 20 K 5/2    |
| R 37<br>55<br>66<br>87                                        | 4  | 500Ω $\pm 5\%$ ; 0,33W                                                       | B 51264 A 500 Ω 5/2   |
| R 38                                                          | 1  | 100Ω $\pm 5\%$ ; 0,33W                                                       | B 51264 A 100 Ω 5/2   |
| R 39                                                          | 1  | 50Ω $\pm 5\%$ ; 0,25W                                                        | B 51263 A 50 Ω 5/2    |
| R 40                                                          | 1  | 30kΩ $\pm 1\%$ ; 0,1W                                                        | B 51263 A 30 K 1/0,5  |
| R 41                                                          | 1  | 1MΩ $\pm 10\%$ ; 0,33W                                                       | B 51263 A 1 M 10/5    |
| R 43,72                                                       | 2  | 1kΩ $\pm 5\%$ ; 0,33W                                                        | B 51264 A 1 K 5/2     |
| R 45-48                                                       | 4  | 250Ω $\pm 1\%$ ; 0,1W                                                        | B 51263 A 250 Ω 1/0,5 |
| R 50                                                          | 1  | 200Ω $\pm 5\%$ ; 0,33W                                                       | B 51264 A 200 Ω 5/2   |
| R 59                                                          | 1  | 160Ω $\pm 5\%$ ; 0,25W                                                       | B 51263 A 160 Ω 5/2   |
| R 60                                                          | 1  | 30kΩ $\pm 5\%$ ; 0,33W                                                       | B 51264 A 30 K 5/2    |

|             |   |                                                                                                                                                                                      |                            |
|-------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| R 65        | 1 | Schichtwiderstand<br>LAYER-TYPE RESISTOR<br>10k $\Omega$ $\pm$ 5%; 0,33W                                                                                                             | B 51264 A 10 K 5/2         |
| R 74        | 1 | Schicht-Drehwiderstand<br>LAYER-TYPE VAR RESISTOR<br>5k $\Omega$ +20/-30%; 250V-<br><br>Schichtwiderstand<br>LAYER-TYPE RESISTOR<br><br>für Ausführung Rel 35 D 340f 1a<br>FOR MODEL | 5 K lin Rel wd 165a        |
| R 75        | 1 | 19k $\Omega$ $\pm$ 1%; 0,1W                                                                                                                                                          | B 51263 A 19 K 1/0,5       |
| R 76        | 1 | 11k $\Omega$ $\pm$ 1%; 0,1W<br><br>für Ausführung Rel 35 D 340f 2a<br>FOR MODEL                                                                                                      | B 51263 A 11 K 1/0,5       |
| R 75        | 1 | 20,5k $\Omega$ $\pm$ 1%; 0,1W                                                                                                                                                        | B 51263 A 20,5 K 1/0,5     |
| R 76        | 1 | 9,5k $\Omega$ $\pm$ 1%; 0,1W<br><br>für Ausführung Rel 35 D 340f 1a, 2a<br>FOR MODEL                                                                                                 | B 51263 A 9,5 K 1/0,5      |
| R 77        | 1 | 2,5M $\Omega$ $\pm$ 10%; 0,33W                                                                                                                                                       | B 51263 A 2,5 M 10/5       |
| R 78        | 1 | 50k $\Omega$ $\pm$ 5%; 0,075W                                                                                                                                                        | B 51261 A 50 K 5/2         |
| R 79        | 1 | 200 $\Omega$ $\pm$ 5%; 0,25W                                                                                                                                                         | B 51263 A 200 $\Omega$ 5/2 |
| R 80        | 1 | 3k $\Omega$ $\pm$ 5%; 0,33W                                                                                                                                                          | B 51264 A 3 K 5/2          |
| R 84        | 4 | 5k $\Omega$ $\pm$ 5%; 0,25W                                                                                                                                                          | B 51263 A 5 K 5/2          |
| 104,105,109 |   |                                                                                                                                                                                      |                            |
| R 85        | 3 | 250 $\Omega$ $\pm$ 5%; 0,25W                                                                                                                                                         | B 51263 A 250 $\Omega$ 5/2 |
| 101,113     |   |                                                                                                                                                                                      |                            |
| R 88        | 3 | 500 $\Omega$ $\pm$ 5%; 0,25W                                                                                                                                                         | B 51263 A 500 $\Omega$ 5/2 |
| 115,119     |   |                                                                                                                                                                                      |                            |
| R 89        | 1 | 100 $\Omega$ $\pm$ 5%; 0,33W                                                                                                                                                         | B 51264 A 100 $\Omega$ 5/2 |
| R 92        | 1 | 30k $\Omega$ $\pm$ 5%; 0,25W                                                                                                                                                         | B 51263 A 30 K 5/2         |
| R 99        | 1 | Thernewid<br>THERNEWID THERMISTOR<br>R <sub>20</sub> =100 $\Omega$ $\pm$ 5%; TK - 3,5%/°C<br><br>Schichtwiderstand<br>LAYER-TYPE RESISTOR                                            | K 11 5% 100 $\Omega$ 3,5   |
| R 100,114   | 2 | 100k $\Omega$ $\pm$ 5%; 0,25W                                                                                                                                                        | B 51263 A 100 K 5/2        |
| R 106       | 1 | 4k $\Omega$ $\pm$ 5%; 0,25W                                                                                                                                                          | B 51263 A 4 K 5/2          |
| R 110,112   | 2 | 50k $\Omega$ $\pm$ 5%; 0,25W                                                                                                                                                         | B 51263 A 50 K 5/2         |
| R 118       | 1 | 1,5k $\Omega$ $\pm$ 5%; 0,25W                                                                                                                                                        | B 51263 A 1,5 K 5/2        |
| R 123,124   | 2 | 50k $\Omega$ $\pm$ 1%; 0,1W                                                                                                                                                          | B 51263 A 50 K 1/0,5       |

Schalenkernspule  
POT-CORE COIL

|     |   |                                                                                                                                                                                |                   |
|-----|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Ü 1 | 1 | <p>Wickl. I (1,4)<br/>10 Wdg 0,40 Cu2L 0,06Ω</p> <p>Wickl. IIa,IIb(5,3)(3,6)<br/>5 Wdg 2x0,40 Cu2L verdr.0,04Ω</p>                                                             | Rel Bv 622 N 3297 |
| Ü 2 | 1 | <p>Wickl. I (1,2)<br/>10 Wdg 0,40 Cu2L 0,06Ω<br/>4,86-8,56μH</p> <p>Wickl. IIa,IIb(4,5)(5,6)<br/>5 Wdg 2x0,40 Cu2L verdr.0,04Ω</p> <p>I+II 19,4-34μH<br/>IIa+IIb= I ±0,6μH</p> | Rel Bv 622 N 3165 |
| Ü 4 | 1 | <p>Wickl. I (1,4,2)<br/>8 1/2 Wdg 0,40 Cu2L 0,05Ω<br/>2,4μH ±10%</p> <p>Abgriff (4): 3 Wdg</p>                                                                                 | Rel Bv 622 N 3166 |
| Ü 5 | 1 | <p>Wickl. I (1,2)<br/>2 Wdg 0,50 CuL 0,013Ω</p> <p>Wickl. IIa,IIb(3,4)(4,5)<br/>2 Wdg 2x0,50 CuL verdr. 0,014Ω<br/>0,1-0,3μH<br/>IIa=IIb ±0,02μH</p>                           | Rel Bv 622 N 3167 |
| Ü 6 | 1 | <p>Wickl. I (3,2)<br/>32 Wdg 0,20 Cu2L 0,6Ω<br/>99μH ±6%</p> <p>Wickl. IIa,IIb(5,4)(4,6)<br/>16 Wdg 2x0,20 Cu2L verdr. 0,4Ω<br/>I+IIa+IIb= 376-424μH</p>                       | Rel Bv 622 N 3168 |
| Ü 7 | 1 | <p>Wickl. I (1,2)<br/>40 Wdg 0,30 Cu2L 0,4Ω<br/>80μH ±10%</p> <p>Wickl. IIa,IIb(4,5)(5,6)<br/>4 Wdg 2x0,30 Cu2L verdr. 0,06Ω<br/>IIa=IIb ±0,05μH</p>                           | Rel Bv 622 N 3124 |
| Ü 8 | 1 | <p>Wickl. I (1,2)<br/>60 Wdg 0,24 CuL 1,1Ω<br/>9mH ±20%</p> <p>Wickl. IIa,IIb(4,5)(5,6)<br/>30 Wdg 2x0,24 CuL verdr. 0,7Ω<br/>1,8-2,7mH<br/>IIa=IIb ±0,02mH</p>                | Rel Bv 622 P 3148 |
| Ü 9 | 1 | <p>Wickl. I (1,3)<br/>130 Wdg 0,20 CuL 3,6Ω<br/>10,1mH ±5%</p> <p>Wickl. IIa,IIb(4,6)(6,5)<br/>32 Wdg 2x0,20 CuL verdr. 1,1Ω<br/>0,576-0,65mH<br/>IIa=IIb ±0,01mH</p>          | Rel Bv 622 P 3149 |

Schalenkernspule  
POT-CORE COIL

Ü 10 1 Wicklg. I (1,2) Rel Bv 622 P 3150  
310 Wdg 0,12 CuL 25Ω  
Wickl. IIa,IIb(4,6)(6,5)  
155 Wdg 2x0,12 CuL verdr. 15Ω  
48mH  
IIa=IIb  $\pm 0,5\text{mH}$

Ü 11 1 Wicklg. I (6,1) Rel Bv 622 P 3151  
100 Wdg 0,30 CuL 1,3Ω  
3,67mH  $\pm 4\%$   
Wickl. II (2,5,4)  
18 Wdg 0,20 CuL 0,65Ω  
Abgriff (5): 9 Wdg  
Wickl. III  
9 Wdg 0,20 CuL 0,38Ω

A 1 Rundrelais Rel Bv 662 P 1046  
ROUND RELAY Rel rls 19a  
19000 Wdg 0,07 CuL 2300Ω $\pm 10\%$

B 1 Kammrelais T rls 162a T Bv 65422/121d  
CRADLE RELAY  
7700 Wdg 0,06 CuL 1250Ω

Tiefpaß 17 MHz Rel 35 D 420f 1a (Ausgabe I)  
LOW-PASS FILTER 17 MC/S (ISSUE I)

C 1 1 Keramik-Kondensator B 38218 NO75 A 10 C  
CERAMIC CAPACITOR  
10pF  $\pm 0,25\text{pF}$ ; 500V-

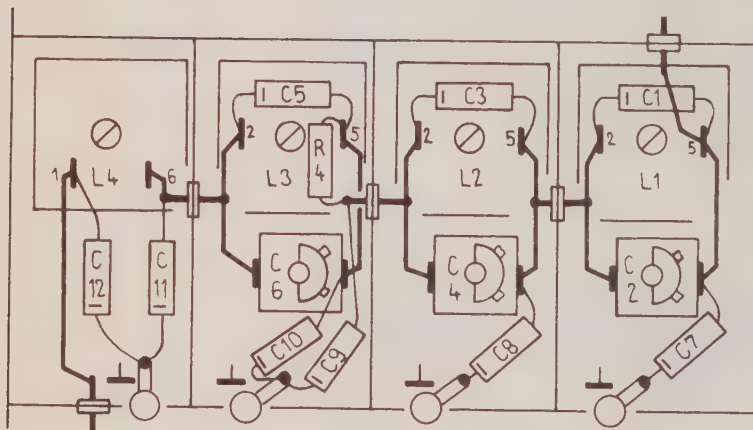
C 2,4,6 3 Lufttrimmer Rel ko 131d  
AIR-DIELECTRIC TRIMMER  
1,9-11pF  $\pm 15\%$ ; 250V-

Keramik-Kondensator  
CERAMIC CAPACITOR

C 3 1 28pF  $\pm 1\%$ ; 500V- B 38223 NO75 C 28 F  
C 5 1 21pF  $\pm 1\%$ ; 500V- B 38223 NO75 C 21 F  
C 7 1 27pF  $\pm 1\%$ ; 500V- B 38223 NO75 C 27 F  
C 8 1 55pF  $\pm 1\%$ ; 500V- B 38223 NO75 J 55 F  
C 9,10 2 25pF  $\pm 1\%$ ; 500V- B 38223 NO75 C 25 F  
C 11 1 60pF  $\pm 1\%$ ; 500V- B 38223 NO75 J 60 F  
C 12 1 32pF  $\pm 1\%$ ; 500V- B 38223 NO75 D 32 F

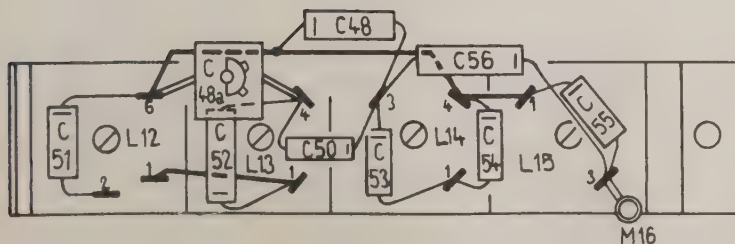
Schalenkernspule  
POT-CORE COIL

|     |   |                                                                   |                    |
|-----|---|-------------------------------------------------------------------|--------------------|
| L 1 | 1 | Wickl. I (5,2)<br>8 1/2 Wdg 0,60 CuL 0,023Ω<br>2,03μH $\pm 2\%$   | Rel Bv 622 N 3198  |
| L 2 | 1 | Wickl. I (2,5)<br>8 Wdg 0,60 CuL 0,02Ω<br>1,78μH $\pm 2\%$        | Rel Bv 622 N 3199  |
| L 3 | 1 | Wickl. I (2,5)<br>8 1/2 Wdg 0,60 CuL 0,023Ω<br>2,03μH $\pm 2\%$   | Rel Bv 622 N 3298  |
| L 4 | 1 | Wickl. I (1,6)<br>9 1/2 Wdg 0,60 CuL 0,027Ω<br>2,5μH $\pm 2\%$    | Rel Bv 622 N 3200  |
| R 4 | 1 | Schichtwiderstand<br>LAYER-TYPE RESISTOR<br>25Ω $\pm 5\%$ ; 0,25W | B 51263 A 25 Ω 5/2 |



Tiefpaß 17 MHz Rel ms 35 D 420f 1a (Ausgabe I)  
LOW-PASS FILTER 17 MC/S Rel ms 35 D 420f 1a (ISSUE I)

|       |   |                                                                                               |                     |
|-------|---|-----------------------------------------------------------------------------------------------|---------------------|
| C 48  | 1 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>797pF $\pm 1\%$ ; 125V-                           | B31140-A1791-F700   |
| C 48a | 1 | Lufttrimmer<br>AIR-DIELECTRIC TRIMMER<br>1,9-11pF $\pm 15\%$ ; 250V-                          | Rel ko 131d         |
|       |   | Keramik-Kondensator<br>CERAMIC CAPACITOR                                                      |                     |
| C 50  | 1 | 25pF $\pm 2\%$ ; 500V-                                                                        | B 38223 N075 C 25 G |
| C 54  | 1 | 53pF $\pm 1\%$ ; 500V-                                                                        | B 38223 N075 J 53 F |
| C 55  | 1 | 97pF $\pm 1\%$ ; 500V-                                                                        | B 38223 N075 F 97 F |
| C 56  | 1 | 21pF $\pm 2\%$ ; 500V-                                                                        | B 38223 N075 C 21 G |
|       |   | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR                                                      |                     |
| C 51  | 1 | 485pF $\pm 1\%$ ; 125V-                                                                       | B31140-A1481-F500   |
| C 52  | 1 | 358pF $\pm 1\%$ ; 125V-                                                                       | B31140-A1351-F800   |
| C 53  | 1 | 169pF $\pm 1\%$ ; 125V-                                                                       | B31140-A1161-F900   |
|       |   | Schalenkernspule<br>POT-CORE COIL                                                             |                     |
| L 12  | 1 | Wickl. I (2,1,6)<br>21 Wdg HFL S 60x0,04 0,37 $\Omega$<br>22,5 $\mu$ H<br>Abgriff (1): 16 Wdg | Rel Bv 622 N 3392   |
| L 13  | 1 | Wickl. I (1,4)<br>24 Wdg HFL S 60x0,04 0,4 $\Omega$<br>28,2 $\mu$ H $\pm 2\%$                 | Rel Bv 622 N 3393   |
| L 14  | 1 | Wickl. I (1,4)<br>34 Wdg HFL S 45x0,04 0,65 $\Omega$<br>56,4 $\mu$ H $\pm 2\%$                | Rel Bv 622 N 3394   |
| L 15  | 1 | Wickl. I (1,3)<br>42 Wdg HFL S 45x0,04 0,75 $\Omega$<br>87,4 $\mu$ H $\pm 2\%$                | Rel Bv 622 N 3395   |



Kf-Kondensator  
 PLASTIC-FOIL CAPACITOR

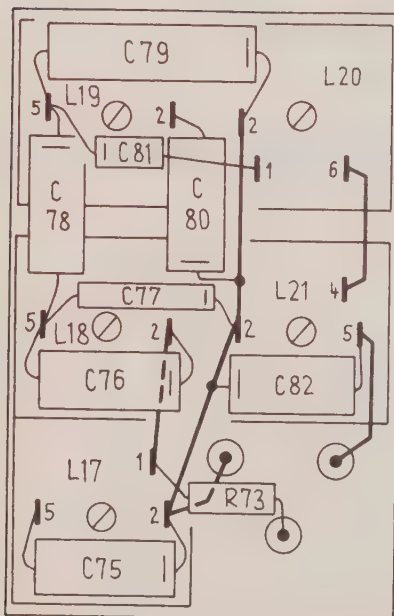
|      |   |                                                                    |                     |
|------|---|--------------------------------------------------------------------|---------------------|
| C 75 | 1 | 7665pF $\pm 1\%$ ; 125V-                                           | B31140-A1762-F560   |
| C 76 | 1 | 6279pF $\pm 1\%$ ; 125V-                                           | B31140-A1622-F790   |
| C 77 | 1 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>34pF $\pm 1\%$ ; 500V- | B 38223 NO75 D 34 F |

Kf-Kondensator  
 PLASTIC-FOIL CAPACITOR

|      |   |                          |                   |
|------|---|--------------------------|-------------------|
| C 78 | 1 | 1070pF $\pm 1\%$ ; 125V- | B31141-A1102-F700 |
| C 79 | 1 | 11790pF $\pm 1\%$ ; 125V | B31143-A1173-F790 |
| C 80 | 1 | 3160pF $\pm 1\%$ ; 125V- | B31141-A1312-F600 |
| C 81 | 1 | 145pF $\pm 1\%$ ; 125V-  | B31140-A1141-F500 |
| C 82 | 1 | 1920pF $\pm 1\%$ ; 125V- | B31141-A1192-F200 |

Schalenkernspule  
 POT-CORE COIL

|      |   |                                                                                         |                   |
|------|---|-----------------------------------------------------------------------------------------|-------------------|
| L 17 | 1 | Wickl. I (2,1,5)<br>97 Wdg HFL S 20x0,05 3Ω<br>1,303mH $\pm 1\%$<br>Abgriff (1): 34 Wdg | Rel Bv 622 P 3153 |
| L 18 | 1 | Wickl. I (5,2)<br>60 Wdg HFL S 45x0,05 0,75Ω<br>1,36mH $\pm 1\%$                        | Rel Bv 622 P 3154 |



Schalenkernspule  
POT-CORE COIL

|      |   |                                                                                      |                       |
|------|---|--------------------------------------------------------------------------------------|-----------------------|
| L 19 | 1 | Wickl. I (5,2)<br>101 Wdg HFL S 20x0,05 2,8Ω<br>3,8mH $\pm 1\%$                      | Rel Bv 622 P 3155     |
| L 20 | 1 | Wickl. I (6,1)<br>413 Wdg 0,15 CuL 23Ω<br>63,2mH $\pm 1\%$                           | Rel Bv 622 P 3156     |
| L 21 | 1 | Wickl. I (2,4,5)<br>195 Wdg 0,24 CuL 4,1Ω<br>5,29mH $\pm 1\%$<br>Abgriff (4): 34 Wdg | Rel Bv 622 P 3157     |
| R 73 | 1 | Schichtwiderstand<br>LAYER-TYPE RESISTOR<br>795Ω $\pm 1\%$ ; 0,15W                   | B 51264 A 795 Ω 1/0,5 |

3-kHz-Filter Rel 35 D 344f 1a (Ausgabe II)  
3-KC/S FILTER (ISSUE II)

Kf-Kondensator  
PLASTIC-FOIL CAPACITOR

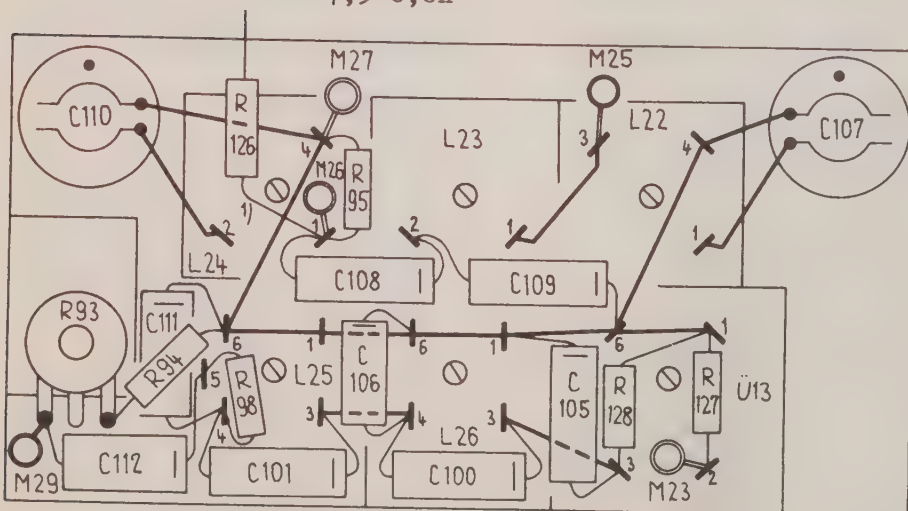
|       |   |                                                                |                   |
|-------|---|----------------------------------------------------------------|-------------------|
| C 100 | 1 | 197pF $\pm 1\%$ ; 125V-                                        | B31140-A1191-F700 |
| C 101 | 1 | 507pF $\pm 1\%$ ; 125V-                                        | B31140-A1501-F700 |
| C 105 | 1 | 1875pF $\pm 1\%$ ; 125V-                                       | B31141-A1182-F750 |
| C 106 | 1 | 3845pF $\pm 1\%$ ; 125V-                                       | B31141-A1382-F450 |
| C 107 | 1 | 44350pF $\pm 0,5\%$ ; 125V-                                    | B31052-A1443-D350 |
| C 108 | 1 | 1695pF $\pm 0,5\%$ ; 500V-                                     | B31072-A5162-D950 |
| C 109 | 1 | 4494pF $\pm 0,5\%$ ; 125V-                                     | B31072-A1442-D940 |
| C 110 | 1 | 43967pF $\pm 0,5\%$ ; 125V-                                    | B31052-A1433-D967 |
| C 111 | 1 | 1790pF $\pm 1\%$ ; 125V-                                       | B31141-A1172-F900 |
| C 112 | 1 | MKH-Kondensator<br>MKH CAPACITOR<br>0,033μF $\pm 20\%$ ; 300V- | B32220-A3333-M    |

Schalenkernspule  
POT-CORE COIL

|      |   |                                                                                                           |                   |
|------|---|-----------------------------------------------------------------------------------------------------------|-------------------|
| L 22 | 1 | Wickl. I (4,3)<br>79 Wdg 0,19 Cu2L 2,3Ω<br>3,805mH $\pm 1\%$<br>Wickl. II (3,1)<br>243 Wdg 0,19 Cu2L 8,4Ω | Rel Bv 622 P 3162 |
| L 23 | 1 | Wickl. I (1,2)<br>858 Wdg 0,07 Cu2L 195Ω<br>454,7mH $\pm 1\%$                                             | Rel Bv 622 P 3164 |

Schalenkernspule  
POT-CORE COIL

|       |   |                                                                                                                              |                       |
|-------|---|------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| L 24  | 1 | Wickl. I (4,1)<br>286 Wdg 0,19 Cu2L 9,5Ω<br>50,6mH $\pm 1\%$                                                                 | Rel Bv 622 P 3163     |
|       |   | Wickl. II (1,2)<br>32 Wdg 0,19 Cu2L 2,5Ω                                                                                     |                       |
| L 25  | 1 | Wickl. I (4,3)<br>700 Wdg 0,12 Cu2L 59Ω                                                                                      | Rel Bv 622 P 3274     |
| L 26  | 1 | Wickl. I (4,3)<br>718 Wdg 0,12 Cu2L 62Ω                                                                                      | Rel Bv 622 P 3273     |
| R 93  | 1 | Schicht-Drehwiderstand<br>LAYER-TYPE VAR RESISTOR<br>2kΩ $\pm 20/-30\%$ ; 0,1W                                               | 2 kΩ lin Rel wd 165a  |
|       |   | Schichtwiderstand<br>LAYER-TYPE RESISTOR                                                                                     |                       |
| R 94  | 1 | 7,5kΩ $\pm 1\%$ ; 0,1W                                                                                                       | B 51263 A 7,5 K 1/0,5 |
| R 95  | 1 | 8kΩ $\pm 1\%$ ; 0,1W                                                                                                         | B 51263 A 8 K 1/0,5   |
| R 98  | 1 | 500Ω $\pm 1\%$ ; 0,1W                                                                                                        | B 51263 A 500 Ω 1/0,5 |
| R 126 | 1 | 1kΩ $\pm 5\%$ ; 0,25W                                                                                                        | B 51263 A 1 K 5/2     |
| R 127 | 1 | 17kΩ $\pm 1\%$ ; 0,1W                                                                                                        | B 51263 A 17 K 1/0,5  |
| R 128 | 1 | 280kΩ $\pm 5\%$ ; 0,25W                                                                                                      | B 51263 A 280 K 5/2   |
| Ü 13  | 1 | Übertrager<br>TRANSFORMER<br>Wickl. I (7,2)<br>652 Wdg 0,14 CuL 46Ω<br>Wickl. II (2,3)<br>2008 Wdg 0,09 CuL 400Ω<br>7,3-8,8H | Rel Bv 622 S 3336     |

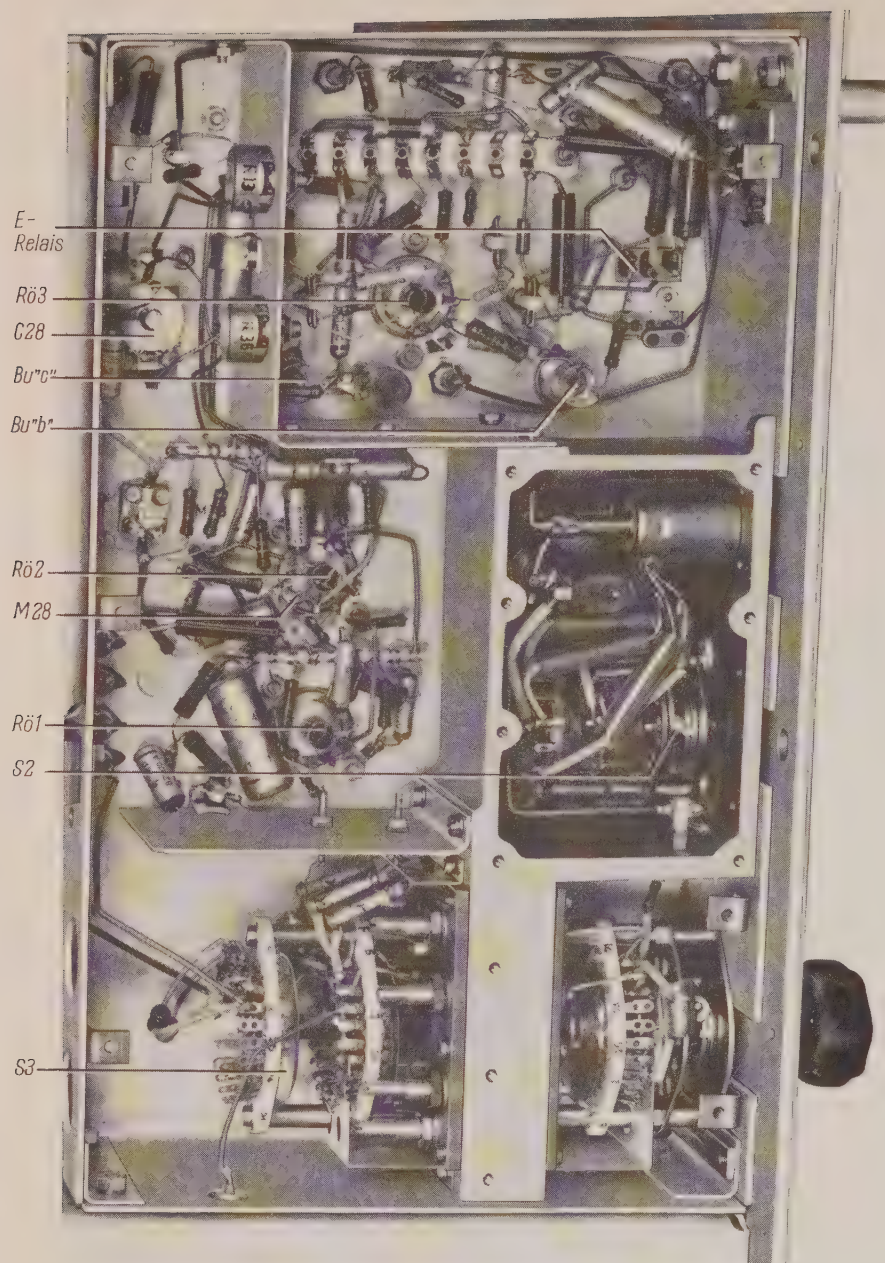


3-kHz-Filter Rel ms 35 D 344f 1a (Ausgabe II)  
3-KC/S FILTER Rel ms 35 D 344f 1a (ISSUE II)

Eingangsteiler  
 INPUT DIVIDER

|   |   |                      |       |               |    |    |
|---|---|----------------------|-------|---------------|----|----|
| 1 | } | für Ausfg./FOR MODEL | 1a, b | Rel 35 D 365f | 1a | 27 |
| 1 |   |                      | 2a, b |               | 2a |    |
| 1 |   |                      | 3a, b |               | 3a |    |
| 1 |   |                      | 4a, b |               | 4a |    |

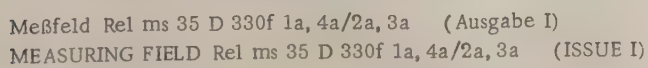
|                                                  |    |                                                                                    |                    |
|--------------------------------------------------|----|------------------------------------------------------------------------------------|--------------------|
| C 19                                             | 1  | Elektrolyt-Kondensator<br>ELECTROLYTIC CAPACITOR<br>10µF +30/-20%; 35V-            | B41921-A7106-R     |
| C 20                                             | 1  | MKH-Kondensator<br>MKH CAPACITOR<br>0,047µF ±20%; 300V-                            | B32220-A3473-M     |
| C 21,27<br>45<br>52                              | 4  | MKL-Kondensator<br>MKL CAPACITOR<br>0,1µF ±20%; 100V-                              | B32110-C0104-M     |
| C 23,24,39<br>40,44,48,49<br>51                  | 8  | MKH-Kondensator<br>MKH CAPACITOR<br>0,01µF ±20%; 300V-                             | B32220-A3103-M     |
| C 26                                             | 1  | MKL-Kondensator<br>MKL CAPACITOR<br>0,47µF ±20%; 60V-                              | B32110-D9474-M     |
| Lufttrimmer<br>AIR-DIELECTRIC TRIMMER            |    |                                                                                    |                    |
| C 28                                             | 1  | 2-31pF +15%; 250V-                                                                 | Rel ko 130b        |
| C 29                                             | 1  | 1,9-11pF +15%; 250V-                                                               | Rel ko 131d        |
| Elektrolyt-Kondensator<br>ELECTROLYTIC CAPACITOR |    |                                                                                    |                    |
| C 31                                             | 1  | 2µF +50/-10%; 150V-                                                                | B43711-A1205-T     |
| C 32                                             | 1  | 2µF +50/-20%; 35V-                                                                 | B41951-A7205-S     |
| C 33                                             | 1  | 4µF +50/-10%; 250V-                                                                | B43711-A2405-T     |
| C 34                                             | 1  | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>6pF ±0,5pF; 500V-                      | B 38223 P100 C 6 D |
| C 35,37,38<br>41,54-56<br>58-60                  | 10 | Keramik-Durchführungskond.<br>CERAMIC LEAD-THROUGH CAP'R<br>5000pF +30/-20%; 500V- | B37480-A5502-R000  |
| Keramik-Kondensator<br>CERAMIC CAPACITOR         |    |                                                                                    |                    |
| C 43                                             | 1  | 8000pF +30/-20%; 500V-                                                             | B 37636 U 8000 R   |
| C 46                                             | 1  | 250pF +50/-20%; 500V-                                                              | B 37618 L 250 S    |



Weitere Einzelheiten siehe Rel ms 35 D 330 ... ; 35 D 365 ...  
FOR MORE DETAILS SEE

Meßfeld und Eingangsteiler im Pegelmesser  
MEASURING FIELD AND INPUT DIVIDER OF THE LEVEL METER

Bild 4  
FIG. 4



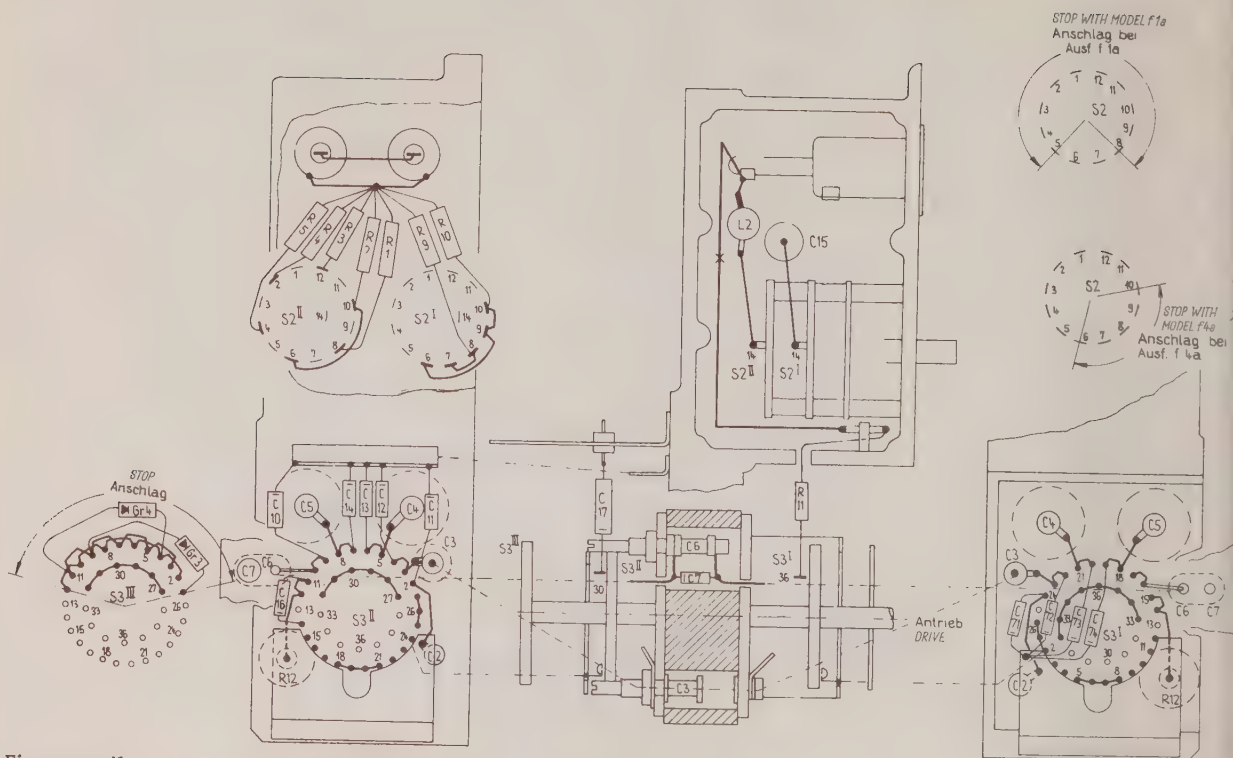
|                        |   |                                                                                   |                              |
|------------------------|---|-----------------------------------------------------------------------------------|------------------------------|
| C 53                   | 1 | Elektrolyt-Kondensator<br>ELECTROLYTIC CAPACITOR<br>1 $\mu$ F +50/-10%; 250V-     | B43711-A2105-T               |
| Gr 2                   | 1 | Zwerggleichrichter<br>MINIATURE RECTIFIER<br>25V / 5mA                            | V23201-H0441                 |
|                        |   | UKW-Drossel<br>VHF REACTOR                                                        |                              |
| L 1                    | 1 | 12 $\mu$ H 3A                                                                     | B82501-A-A33                 |
| L 3                    | 1 | 40 $\mu$ H 0,3A                                                                   | B82501-A-A7                  |
| L 4                    | 1 | 12 $\mu$ H 0,3A                                                                   | B82501-D-A16                 |
| L 6,8                  | 2 | 30 $\mu$ H 1,5A                                                                   | B82501-A-A35                 |
|                        |   | Spule<br>COIL                                                                     |                              |
| L 5                    | 1 | 21 Wdg 0,32 CuL 0,062 $\Omega$                                                    | Rel Bv 623 B 3034            |
| L 7                    | 1 | 16 Wdg 0,50 CuL 0,03 $\Omega$                                                     | Rel Bv 623 A 3157            |
| L 9                    | 1 | 14 Wdg 0,50 CuL 0,03 $\Omega$                                                     | Rel Bv 623 A 3027            |
| R 13                   | 1 | Schicht-Drehwiderstand<br>LAYER-TYPE VAR RESISTOR<br>100k $\Omega$ +20/-30%; 0,1W | 100 K lin Rel wd 165a        |
|                        |   | Schichtwiderstand<br>LAYER-TYPE RESISTOR                                          |                              |
| R 14                   | 1 | 2M $\Omega$ $\pm$ 10%; 0,33W                                                      | B 51263 A 2 M 10/5           |
| R 15,21,29<br>33<br>53 | 5 | 40 $\Omega$ $\pm$ 5%; 0,15W                                                       | B 51262 A 40 $\Omega$ 5/2    |
| R 16                   | 1 | 160k $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 160 K 5/2          |
| R 18                   | 1 | 3k $\Omega$ $\pm$ 5%; 0,33W                                                       | B 51264 A 3 K 5/2            |
| R 19                   | 1 | 160 $\Omega$ $\pm$ 5%; 0,25W                                                      | B 51263 A 160 $\Omega$ 5/2   |
| R 20,30                | 2 | 2k $\Omega$ $\pm$ 5%; 0,33W                                                       | B 51264 A 2 K 5/2            |
| R 23                   | 1 | 100 $\Omega$ $\pm$ 5%; 0,25W                                                      | B 51263 A 100 $\Omega$ 5/2   |
| R 24                   | 1 | 5 $\Omega$ $\pm$ 5%; 0,33W                                                        | B 51264 A 5 $\Omega$ 5/2     |
| R 25,26<br>34,48,52    | 5 | 400k $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 400 K 5/2          |
| R 28                   | 1 | 20k $\Omega$ $\pm$ 5%; 0,25W                                                      | B 51263 A 20 K 5/2           |
| R 31                   | 1 | 400 $\Omega$ $\pm$ 5%; 0,25W                                                      | B 51263 A 400 $\Omega$ 5/2   |
| R 35                   | 1 | 250k $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 250 K 5/2          |
| R 36                   | 1 | Schicht-Drehwiderstand<br>LAYER-TYPE VAR RESISTOR<br>500 $\Omega$ +20/-20%; 0,1W  | 500 $\Omega$ lin Rel wd 165a |

Schichtwiderstand  
LAYER-TYPE RESISTOR

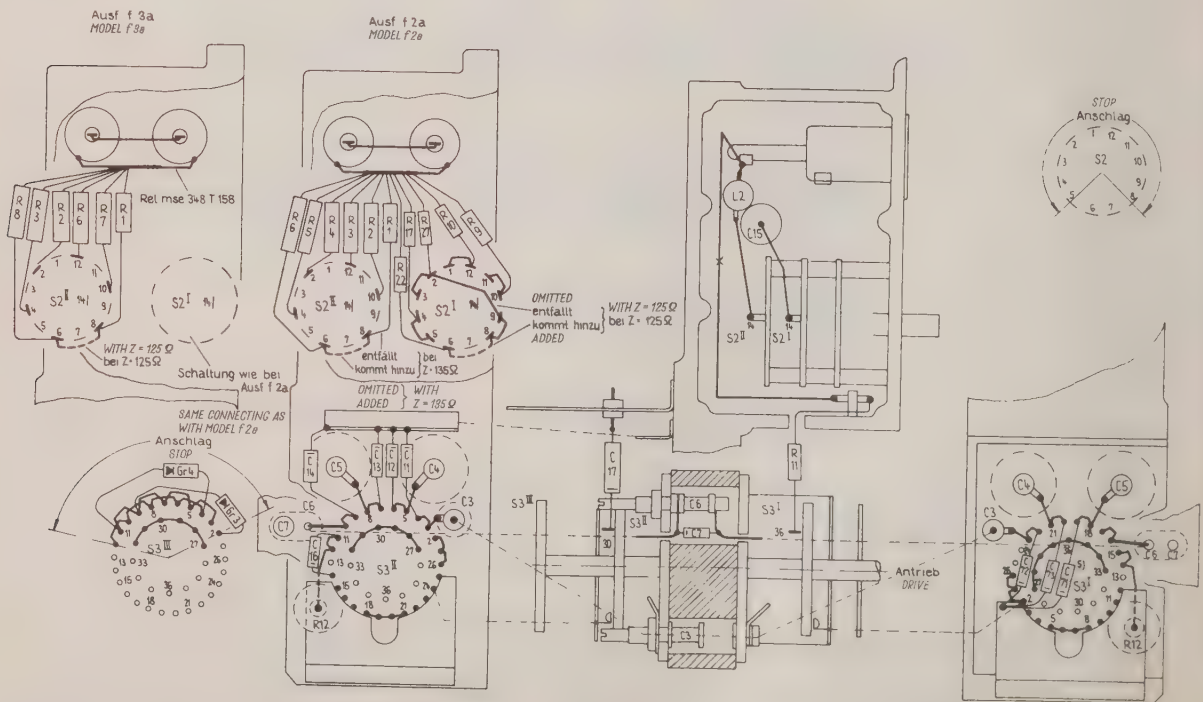
|         |   |                                                       |                            |
|---------|---|-------------------------------------------------------|----------------------------|
| R 37    | 1 | 300Ω $\pm 5\%$ ; 0,25W                                | B 51263 A 300 Ω 5/2        |
| R 38    | 1 | 500Ω $\pm 1\%$ ; 0,1W                                 | B 51263 A 500 Ω 1/0,5      |
| R 40    | 1 | 200Ω $\pm 5\%$ ; 0,33W                                | B 51264 A 200 Ω 5/2        |
| R 41    | 1 | 50Ω $\pm 5\%$ ; 0,25W                                 | B 51263 A 50 Ω 5/2         |
| R 42    | 1 | 8Ω $\pm 5\%$ ; 0,5W                                   | B 51265 A 8 Ω 5/2          |
| R 43    | 1 | 10kΩ $\pm 5\%$ ; 1W                                   | B 51266 A 10 K 5/2         |
| R 44    | 1 | 250Ω $\pm 5\%$ ; 0,25W                                | B 51263 A 250 Ω 5/2        |
| R 46    | 1 | 250Ω $\pm 1\%$ ; 0,25W                                | B 51263 A 250 Ω 1/2        |
| R 47    | 1 | 80kΩ $\pm 5\%$ ; 0,25W                                | B 51263 A 80 K 5/2         |
| R 49    | 1 | 10kΩ $\pm 5\%$ ; 0,15W                                | B 51262 A 10 K 5/2         |
| R 50,54 | 2 | 2kΩ $\pm 5\%$ ; 0,33W                                 | B 51264 A 2 K 5/2          |
| R 51    | 1 | 10Ω $\pm 5\%$ ; 0,15W                                 | B 51262 A 10 Ω 5/2         |
| R 56    | 1 | 200Ω $\pm 5\%$ ; 0,25W                                | B 51263 A 200 Ω 5/2        |
| R 57    | 1 | 30Ω $\pm 5\%$ ; 0,25W                                 | B 51263 A 30 Ω 5/2         |
| R 58    | 1 | 500Ω $\pm 5\%$ ; 0,25W                                | B 51263 A 500 Ω 5/2        |
| E       | 1 | Kammrelais<br>CRADLE RELAY<br>7700 Wdg 0,06 CuL 1250Ω | T rls 162a T Bv 65422/121d |

Eingangsteiler Rel 35 D 365f 1a-4a (Ausgabe I)  
INPUT DIVIDER (ISSUE I)

|       |   |                                                                                                                          |                                                                  |
|-------|---|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| C 2-5 | 4 | Schraub-Trimmer<br>SCREW-TYPE TRIMMER                                                                                    | in Konstruktion enthalten<br>CONTAINED IN STRUCTURAL<br>ASSEMBLY |
| C 6   | 1 | Keramik-Schraub-Trimmer<br>CERAMIC SCREW-TYPE TRIMMER<br>0,6-4,6pF 500V-<br><br>Keramik-Kondensator<br>CERAMIC CAPACITOR | 4/500 B 39020                                                    |
|       |   | für Ausführung Rel 35 D 365f 1a,4a<br>FOR MODEL                                                                          |                                                                  |
| C 7   | 1 | 12,5pF $\pm 2\%$ ; 500V-                                                                                                 | B 38223 P100 D 12,5 G                                            |
| C 10  | 1 | 80pF $\pm 1\%$ ; 500V-                                                                                                   | B 38223 N075 F 80 F                                              |
| C 74  | 1 | 10pF $\pm 0,25$ pF; 500V-                                                                                                | B 38223 N075 C 10 C                                              |
|       |   | für Ausführung Rel 35 D 365f 2a,3a<br>FOR MODEL                                                                          |                                                                  |
| C 7   | 1 | 10pF $\pm 0,25$ pF; 500V-                                                                                                | B 38223 P100 D 10 C                                              |



Eingangsteiler (Np, Npm) Rel ms 35 D 365f1a, 4a (Ausgabe I)  
 INPUT DIVIDER (N, NM) Rel ms 35 D 365f1a, 4a (ISSUE I)



Eingangsteiler (dB, dBm) Rel ms 35 D 365f 2a, 3a (Ausgabe I)  
 INPUT DIVIDER (DB, DBM) Rel ms 35 D 365f 2a, 3a (ISSUE I)

für Ausführung Rel 35 D 365f 1a-4a  
FOR MODEL

|         |   |                                                                     |                      |
|---------|---|---------------------------------------------------------------------|----------------------|
| C 11-14 | 4 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>100pF $\pm 1\%$ ; 500V- | B 38223 N075 F 100 F |
|---------|---|---------------------------------------------------------------------|----------------------|

|      |   |                                                                        |               |
|------|---|------------------------------------------------------------------------|---------------|
| C 15 | 1 | Durchführungskondensator<br>LEAD-THROUGH CAPACITOR<br>0,1 $\mu$ F 80V- | B 85121 AB 10 |
|------|---|------------------------------------------------------------------------|---------------|

|               |   |                                                                    |                     |
|---------------|---|--------------------------------------------------------------------|---------------------|
| C 16<br>71-73 | 4 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>16pF $\pm 2\%$ ; 500V- | B 38223 N075 C 16 G |
|---------------|---|--------------------------------------------------------------------|---------------------|

|      |   |                                                                      |                |
|------|---|----------------------------------------------------------------------|----------------|
| C 17 | 1 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>1000pF $\pm 5\%$ ; 125V- | B31141-A5102-J |
|------|---|----------------------------------------------------------------------|----------------|

|        |   |                                                                                                |        |
|--------|---|------------------------------------------------------------------------------------------------|--------|
| Gr 3,4 | 2 | Germanium-Richtleiter<br>GERMANIUM CRYSTAL DIODE<br>$J_D = 5\text{mA}$ ; $U_{Sp} = 40\text{V}$ | GD 1 E |
|--------|---|------------------------------------------------------------------------------------------------|--------|

|     |   |                                               |                   |
|-----|---|-----------------------------------------------|-------------------|
| L 2 | 1 | Spule<br>COIL<br>4 Wdg 0,40 CuL 0,02 $\Omega$ | Rel Bv 623 T 3017 |
|-----|---|-----------------------------------------------|-------------------|

Schichtwiderstand  
LAYER-TYPE RESISTOR

|     |   |                                |                              |
|-----|---|--------------------------------|------------------------------|
| R 1 | 1 | 150 $\Omega$ $\pm 1\%$ ; 0,25W | B 51265 A 150 $\Omega$ 1/0,5 |
| R 2 | 1 | 75 $\Omega$ $\pm 1\%$ ; 0,5W   | B 51266 A 75 $\Omega$ 1/0,5  |
| R 3 | 1 | 65 $\Omega$ $\pm 1\%$ ; 0,5W   | B 51266 A 65 $\Omega$ 1/0,5  |

für Ausführung Rel 35 D 365f 1a,2a,4a  
FOR MODEL

|     |   |                              |                             |
|-----|---|------------------------------|-----------------------------|
| R 4 | 1 | 60 $\Omega$ $\pm 1\%$ ; 0,5W | B 51266 A 60 $\Omega$ 1/0,5 |
| R 5 | 1 | 50 $\Omega$ $\pm 1\%$ ; 0,5W | B 51266 A 50 $\Omega$ 1/0,5 |

für Ausführung Rel 35 D 365f 2a,3a  
FOR MODEL

|     |   |                                |                              |
|-----|---|--------------------------------|------------------------------|
| R 6 | 1 | 135 $\Omega$ $\pm 1\%$ ; 0,25W | B 51265 A 135 $\Omega$ 1/0,5 |
|-----|---|--------------------------------|------------------------------|

für Ausführung Rel 35 D 365f 3a  
FOR MODEL

|     |   |                                |                              |
|-----|---|--------------------------------|------------------------------|
| R 7 | 1 | 140 $\Omega$ $\pm 1\%$ ; 0,25W | B 51265 A 140 $\Omega$ 1/0,5 |
| R 8 | 1 | 750 $\Omega$ $\pm 1\%$ ; 0,1W  | B 51263 A 750 $\Omega$ 1/0,5 |

für Ausführung Rel 35 D 365f 1a,4a  
FOR MODEL

|      |   |                                 |                        |
|------|---|---------------------------------|------------------------|
| R 9  | 1 | 10,9k $\Omega$ $\pm 1\%$ ; 0,1W | B 51263 A 10,9 K 1/0,5 |
| R 10 | 1 | 7,65k $\Omega$ $\pm 1\%$ ; 0,1W | B 51263 A 7,65 K 1/0,5 |

für Ausführung Rel 35 D 365f 2a,3a  
FOR MODEL

|      |   |                                |                       |
|------|---|--------------------------------|-----------------------|
| R 9  | 1 | 5,7k $\Omega$ $\pm 1\%$ ; 0,1W | B 51263 A 5,7 K 1/0,5 |
| R 10 | 1 | 4k $\Omega$ $\pm 1\%$ ; 0,1W   | B 51263 A 4 K 1/0,5   |

Schichtwiderstand  
LAYER-TYPE RESISTOR

für Ausführung Rel 35 D 365f 1a-4a  
FOR MODEL

|      |   |                        |                     |
|------|---|------------------------|---------------------|
| R 11 | 1 | 60Ω $\pm 5\%$ ; 0,15W  | B 51262 A 60 Ω 5/2  |
| R 12 | 1 | 150Ω $\pm 5\%$ ; 0,25W | B 51263 A 150 Ω 5/2 |

für Ausführung Rel 35 D 365f 2a,3a  
FOR MODEL

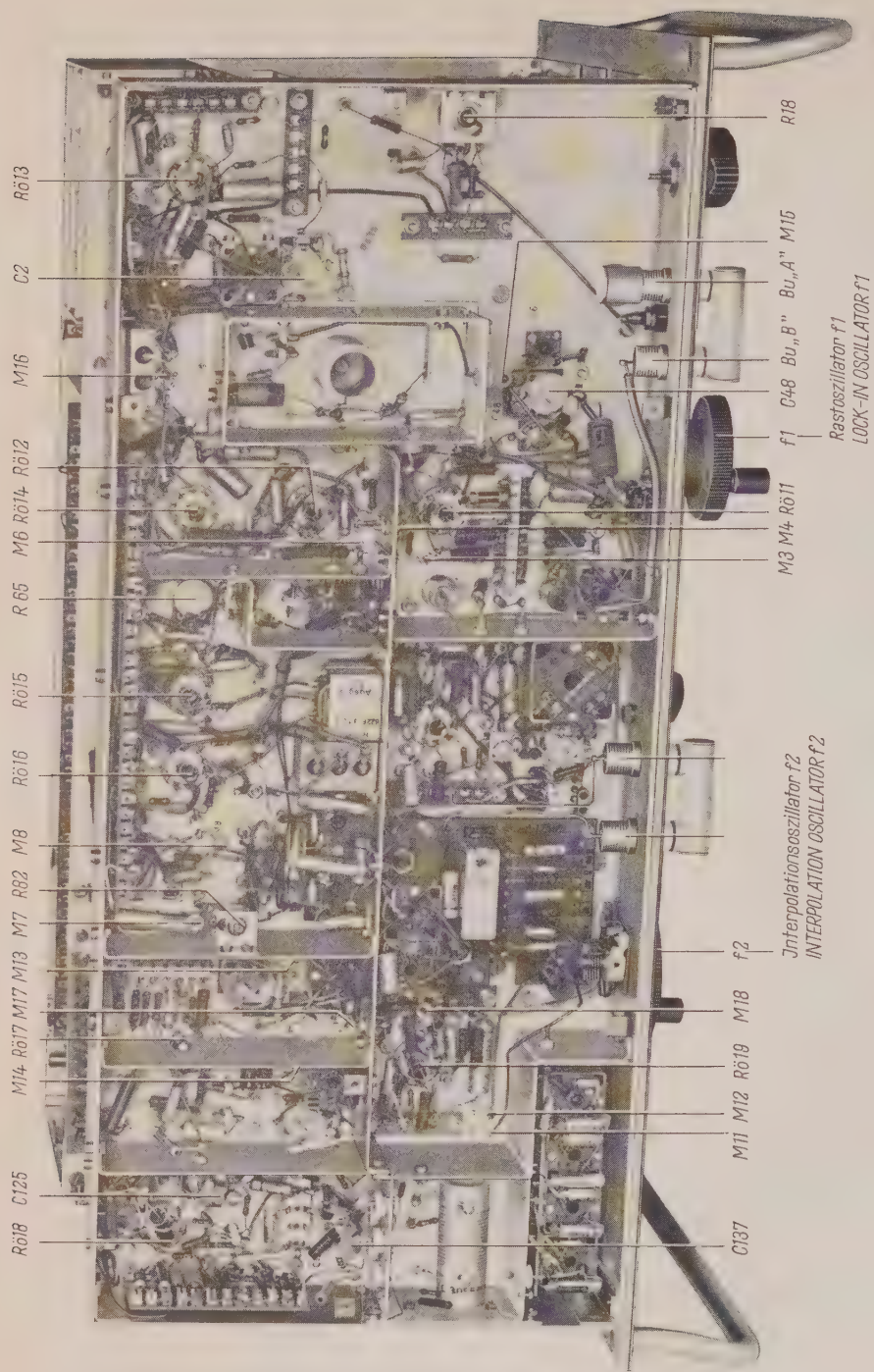
|      |   |                        |                       |
|------|---|------------------------|-----------------------|
| R 17 | 1 | 2,6kΩ $\pm 1\%$ ; 0,1W | B 51263 A 2,6 K 1/0,5 |
| R 22 | 1 | 1,6kΩ $\pm 1\%$ ; 0,1W | B 51263 A 1,6 K 1/0,5 |
| R 27 | 1 | 8kΩ $\pm 1\%$ ; 0,1W   | B 51263 A 8 K 1/0,5   |

|     |   |                                                                                                    |                     |
|-----|---|----------------------------------------------------------------------------------------------------|---------------------|
| S 2 | 1 | Kleindrehschalter<br>MIDGET ROTARY SWITCH<br>1polig; 2 Ebenen; 12stufig<br>1-POLE; 2-DECK; 12-STEP | Rel sch 475b Form A |
|-----|---|----------------------------------------------------------------------------------------------------|---------------------|

|     |   |                               |                                                                  |
|-----|---|-------------------------------|------------------------------------------------------------------|
| S 3 | 1 | Drehschalter<br>ROTARY SWITCH | in Konstruktion enthalten<br>CONTAINED IN STRUCTURAL<br>ASSEMBLY |
|-----|---|-------------------------------|------------------------------------------------------------------|

Oszillator-Baugruppe Rel 35 D 328f 1a (Ausgabe I)  
OSCILLATOR SUBASSEMBLY (ISSUE I)

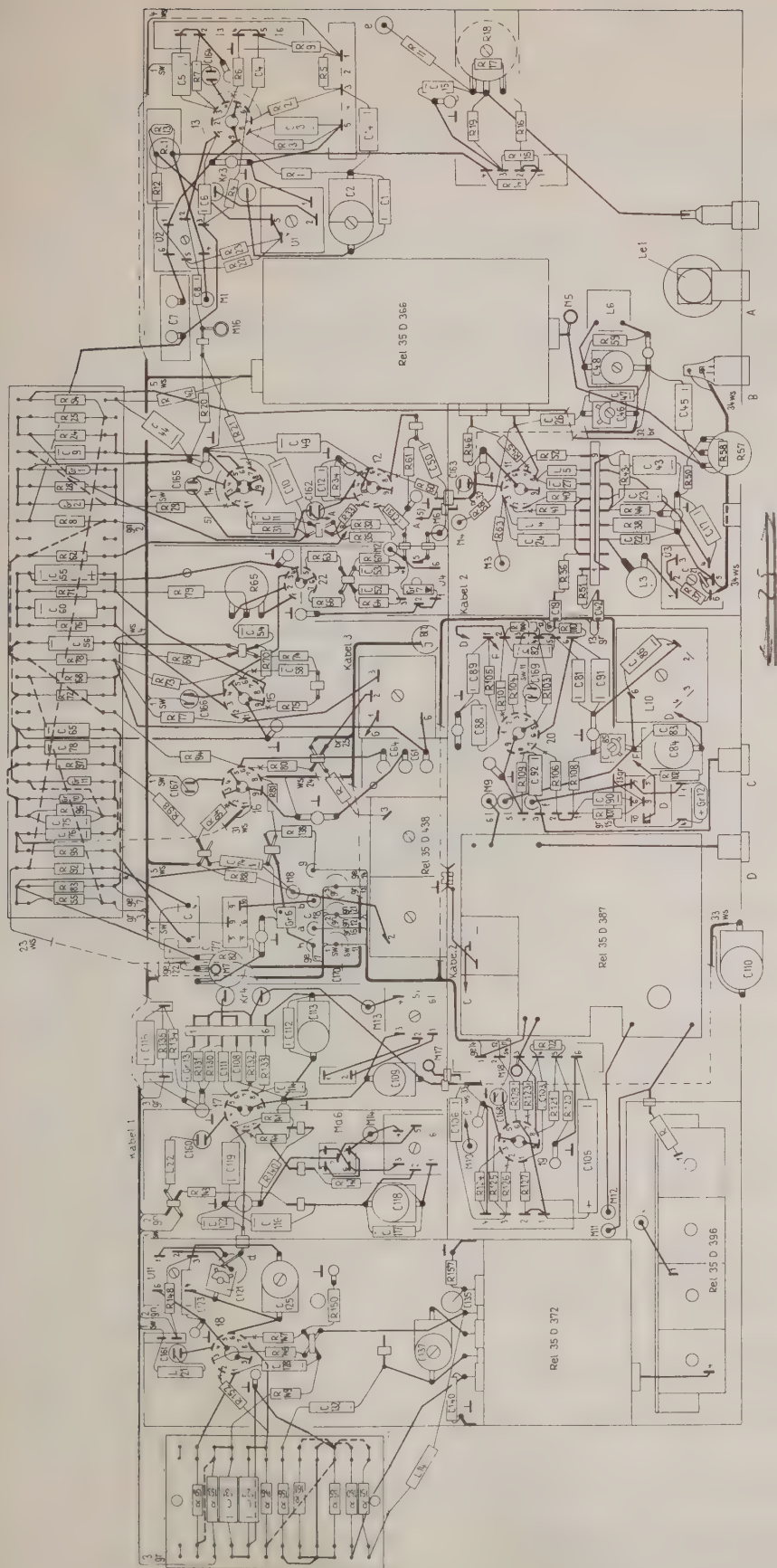
|                                               |   |                                                                      |                     |    |
|-----------------------------------------------|---|----------------------------------------------------------------------|---------------------|----|
|                                               | 1 | Abstimmeinheit I<br>TUNING UNIT I                                    | Rel 35 D 366f 1a    | 41 |
|                                               | 1 | Abstimmeinheit II<br>TUNING UNIT II                                  | Rel 35 D 372f 1a    | 43 |
|                                               | 1 | Diskriminator<br>DISCRIMINATOR                                       | Rel 35 D 387f 1a    | 44 |
|                                               | 1 | Tiefpaß 150 kHz<br>LOW-PASS FILTER 150 KC/S                          | Rel 35 D 396f 1a    | 45 |
|                                               | 1 | Tiefpaß 50 kHz<br>LOW-PASS FILTER 50 KC/S                            | Rel 35 D 438f 1a    | 47 |
| C 1                                           | 1 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>60pF $\pm 5\%$ ; 500V-   | B 38223 NO75 J 60 J |    |
| C 2<br>113,118<br>125                         | 4 | Lufttrimmer<br>AIR-DIELECTRIC TRIMMER<br>3,5-54pF $\pm 15\%$ ; 250V- | Rel ko 130d         |    |
| C 3,5<br>23<br>43<br>65<br>115,116<br>123,127 | 9 | MKH-Kondensator<br>MKH CAPACITOR<br>0,047 $\mu$ F $\pm 20\%$ ; 300V- | B32220-A3473-M      |    |
|                                               |   | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR                             |                     |    |
| C 4,9<br>14                                   | 3 | 500pF $\pm 5\%$ ; 125V-                                              | B31140-A1501-J      |    |
| C 6                                           | 1 | 2300pF $\pm 5\%$ ; 125V-                                             | B31141-A1232-J      |    |
| C 7                                           | 1 | MP-Kondensator<br>MP CAPACITOR<br>0,5 $\mu$ F $\pm 20\%$ ; 250V-     | B25214-A2504-M      |    |
| C 8                                           | 1 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>200pF $\pm 5\%$ ; 125V-  | B31140-A1201-J      |    |
| C 10<br>49<br>88<br>91                        | 4 | MKH-Kondensator<br>MKH CAPACITOR<br>0,1 $\mu$ F $\pm 20\%$ ; 300V-   | B32220-A3104-M      |    |
| C 11,27<br>111,117                            | 4 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>80pF $\pm 2\%$ ; 500V-   | B 38223 NO75 F 80 G |    |



Oszillator-Baugruppe im Pegelmesser  
OSCILLATOR SUBASSEMBLY OF THE LEVEL METER

Bild 5  
FIG. 5

Weitere Einzelheiten siehe Rel ms 35 D 328 ...  
FOR MORE DETAILS SEE

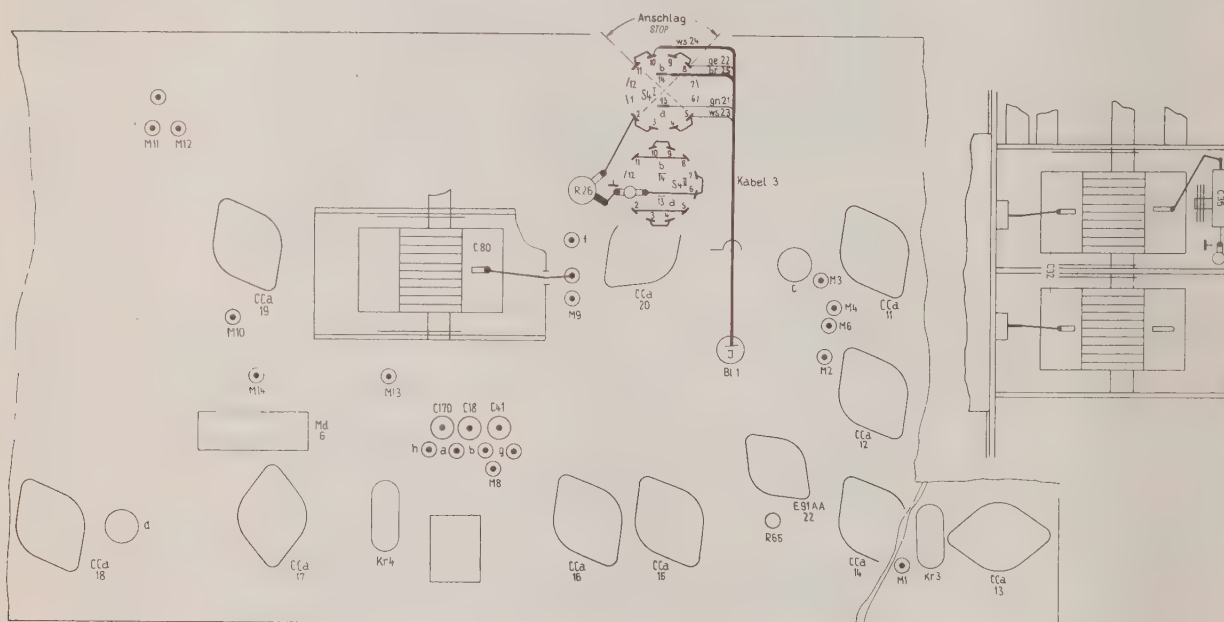


Oszillator-Baugruppe Rel ms 35 D 328f 1a Blatt 1 (Ausgabe I)  
 OSCILLATOR SUBASSEMBLY Rel ms 35 D 328f 1a SHEET 1 (ISSUE I)

|                            |   |                                                                                                                                    |                                                         |
|----------------------------|---|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| C 12,17<br>24<br>76,78,119 | 6 | MKH-Kondensator<br>MKH CAPACITOR<br>0,01 $\mu$ F $\pm$ 20%; 300V-                                                                  | B32220-A3103-M                                          |
| C 13<br>108                | 2 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>47pF $\pm$ 1%; 500V-                                                                   | B 38223 N075 J 47 F                                     |
| C 15<br>74                 | 2 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>1000pF $\pm$ 5%; 125V-                                                                 | B31140-A1102-J                                          |
| C 18,19<br>41,42<br>170    | 5 | Keramik-Durchführungskond.<br>CERAMIC LEAD-THROUGH CAP'R<br>5000pF +30/-20%; 500V-<br><br>Keramik-Kondensator<br>CERAMIC CAPACITOR | B37480-A5502-R000                                       |
| C 21                       | 1 | 25pF $\pm$ 5%; 500V-                                                                                                               | B 38223 N075 A 25 J                                     |
| C 22                       | 1 | 20pF $\pm$ 2%; 500V-                                                                                                               | B 38223 N075 C 20 G                                     |
| C 26                       | 1 | 2,7pF $\pm$ 0,5pF; 500V-                                                                                                           | B 38501 P120 D 2,7 D                                    |
| C 32                       | 1 | Luft-Drehkondensator<br>AIR-DIELECTRIC VAR CAP'R<br>2x220pF $\pm$ 3%; 700V-                                                        | Rel ko 116c<br>Rel Bv 632 A 89<br>Achse wie Rel ko 116b |
| C 35<br>84<br>110          | 3 | Lufttrimmer<br>AIR-DIELECTRIC TRIMMER<br>2-31pF +15%; 250V-<br><br>MKL-Kondensator<br>MKL CAPACITOR                                | Rel ko 130b                                             |
| C 44<br>56                 | 2 | 0,1 $\mu$ F $\pm$ 20%; 100V-                                                                                                       | B32110-C0104-M                                          |
| C 45                       | 1 | 2,2 $\mu$ F $\pm$ 20%; 63V-                                                                                                        | B32110-D9225-M                                          |
| C 46<br>121                | 2 | Lufttrimmer<br>AIR-DIELECTRIC TRIMMER<br>1,9-11pF +15%; 250V-                                                                      | Rel ko 131d                                             |
| C 47                       | 1 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>1pF $\pm$ 0,25pF; 500V-                                                                | B 38215 P033 A 1 C                                      |
| C 48<br>109,137            | 3 | Lufttrimmer<br>AIR-DIELECTRIC TRIMMER<br>1,7-19pF +15%; 250V-<br><br>Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR                      | Rel ko 130a                                             |
| C 50,54,58<br>103,106      | 5 | 1500pF $\pm$ 5%; 125V-                                                                                                             | B31140-A1152-J                                          |
| C 52,53                    | 2 | 200pF $\pm$ 2,5%; 125V-                                                                                                            | B31140-A1201-H                                          |
| C 55                       | 1 | Elektrolyt-Kondensator<br>ELECTROLYTIC CAPACITOR<br>10 $\mu$ F +50/-20%; 35V-                                                      | B41951-A7106-S                                          |

|                |   |                                                                                                                             |                                |
|----------------|---|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| C 60,92<br>131 | 3 | MKH-Kondensator<br>MKH CAPACITOR<br>0,022µF $\pm 20\%$ ; 300V-                                                              | B32220-A3223-M                 |
| C 61/64        | 1 | Doppel-MP-Kondensator<br>DUAL MP CAPACITOR<br>2x1µF $\pm 10\%$ ; 250V-                                                      | B25174-A2205-K                 |
| C 77           | 1 | Elektrolyt-Kondensator<br>ELECTROLYTIC CAPACITOR<br>2µF +50/-10%; 150V-                                                     | B43711-A1205-T                 |
| C 80           | 1 | Luft-Drehkondensator<br>AIR-DIELECTRIC VAR CAP'R<br>220pF $\pm 5\%$ ; 700V-<br><br>Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR | Rel Bv 632 A 89<br>Rel ko 116r |
| C 81           | 1 | 2000pF $\pm 2,5\%$ ; 125V-                                                                                                  | B31141-A1202-H                 |
| C 82           | 1 | 1000pF $\pm 2,5\%$ ; 125V-                                                                                                  | B31140-A1102-H                 |
| C 83           | 1 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>56pF $\pm 1\%$ ; 500V-                                                          | B 38223 N330 D 56 F            |
| C 85           | 1 | Lufttrimmer<br>AIR-DIELECTRIC TRIMMER<br>1,9-13pF +15%; 250V-                                                               | Rel ko 131i                    |
| C 86           | 1 | Keramik-Kondensator<br>CERAMIC CAPACITOR<br>8,2pF $\pm 2pF$ ; 500V-                                                         | B 38223 N075 C 8,2 G           |
| C 89           | 1 | MKH-Kondensator<br>MKH CAPACITOR<br>0,27µF $\pm 20\%$ ; 250V-                                                               | B32231-A3274-M                 |
| C 90           | 1 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>250pF $\pm 5\%$ ; 125V-                                                         | B31140-A1251-J                 |
| C 105          | 1 | Elektrolyt-Kondensator<br>ELECTROLYTIC CAPACITOR<br>4µF +50/-10%; 150V-<br><br>Keramik-Kondensator<br>CERAMIC CAPACITOR     | B43711-A1405-T                 |
| C 112          | 1 | 68pF $\pm 20\%$ ; 500V-                                                                                                     | B 38223 N075 E 68 G            |
| C 114          | 1 | 8pF $\pm 0,25pF$ ; 500V-                                                                                                    | B 38215 N075 A 8 C             |
| C 122,132      | 2 | 160pF $\pm 1\%$ ; 500V-                                                                                                     | B 38223 N075 H 160 F           |
| C 128          | 1 | 100pF $\pm 2\%$ ; 500V-<br><br>Keramik-Kondensator<br>CERAMIC CAPACITOR                                                     | B 38223 N075 F 100 G           |
| C 135          | 1 | 2000pF +30/-20%; 500V-                                                                                                      | B 37638 L 2000 R               |
| C 140          | 1 | 10000pF +30/-20%; 500V-                                                                                                     | B 37643 H 10000 R              |

|           |    |                                                                                                         |                 |
|-----------|----|---------------------------------------------------------------------------------------------------------|-----------------|
| C 160-169 | 10 | Keramik-Bypass-Kondensator<br>CERAMIC BYPASS CAPACITOR<br>2500pF +30/-20%; 350V-                        | B37470-A3252-R  |
| Gr 1,2    | 2  | Germanium-Richtleiter<br>GERMANIUM CRYSTAL DIODE<br>$J_D = 3\text{mA}$ ; $U_{Sp} = 40\text{V}$          | GD 4 E          |
| Gr 6      | 1  | Silizium-Zenerdiode<br>SILICON ZENER DIODE<br>$J_Z = 20\text{mA}$ ; $r_Z = 2\Omega$ ; $U_Z = 6\text{V}$ | SZ 6 KB         |
|           |    | Germanium-Richtleiter<br>GERMANIUM CRYSTAL DIODE                                                        |                 |
| Gr 7      | 1  | $J_D = 200\text{mA}$ ; $U_{Sp} = 100\text{V}$                                                           | OA 5 (Fa.Valvo) |
| Gr 10     | 1  | $J_D = 5\text{mA}$ ; $U_{Sp} = 40\text{V}$                                                              | GD 1 E          |
| Gr 11     | 1  | $J_D = 3\text{mA}$ ; $U_{Sp} = 80\text{V}$                                                              | GD 2 E          |



Oszillator-Baugruppe Rel ms 35 D 328f 1a Blatt 2 (Ausgabe I)  
OSCILLATOR SUBASSEMBLY Rel ms 35 D 328f 1a SHEET 2 (ISSUE I)

|                                                                                    |    |                                                                                                                                                   |                         |
|------------------------------------------------------------------------------------|----|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Gr 12                                                                              | 1  | Zwerggleichrichter<br>MINIATURE RECTIFIER<br>25V / 5mA                                                                                            | V23201-H0441            |
| Gr 13                                                                              | 1  | Richtleiter<br>CRYSTAL DIODE<br>$J_D = 6\text{mA}$ ; $U_{Sp} = 30\text{V}$                                                                        | OA 159 (Fa. Telefunken) |
| L 3                                                                                | 1  | Spule<br>COIL<br>16 Wdg 0,50 CuL 0,03Ω<br><br>UKW-Drossel<br>VHF REACTOR                                                                          | Rel Bv 623 A 3157       |
| L 4,14                                                                             | 2  | 40μH 0,2A                                                                                                                                         | B82501-A-C7             |
| L 5                                                                                | 1  | 12μH 0,3A                                                                                                                                         | B82501-D-A16            |
| L 6                                                                                | 1  | 15 Wdg (2,3) 0,50 CuL 0,025Ω<br>L=1,6μH ±5%                                                                                                       | Rel Bv 623 M 3040       |
| L 10                                                                               | 1  | Schalenkernspule<br>POT-CORE COIL<br><br>Wickl. I (6,4)<br>190 Wdg 0,24 CuL 4,8Ω<br><br>Wickl. II (3,1,3)<br>9 Wdg 0,24 CuL<br>Abgriff (1): 3 Wdg | Rel Bv 622 S 3147       |
| L 21,22                                                                            | 2  | UKW-Drossel<br>VHF REACTOR<br>30μH 1,5A                                                                                                           | B82501-A-A35            |
| Md 6                                                                               | 1  | Modulator<br>MODULATOR<br>$J_D = 5-15\text{mA}$ ; $U_{Sp} = 25\text{V}$<br><br>Schichtwiderstand<br>LAYER-TYPE RESISTOR                           | Rel Bv 672 R 21         |
| R 1,7<br>76<br>140,146                                                             | 5  | 2kΩ ±5%; 0,25W                                                                                                                                    | B 51263 A 2 K 5/2       |
| R 2,6<br>29,33<br>41,60<br>70,75<br>80,94<br>101,106<br>123,126,132<br>142,147,152 | 18 | 40Ω ±5%; 0,15W                                                                                                                                    | B 51262 A 40 Ω 5/2      |
| R 3,71                                                                             | 2  | 4kΩ ±5%; 0,25W                                                                                                                                    | B 51263 A 4 K 5/2       |
| R 4,73<br>103,127,134                                                              | 5  | 10kΩ ±5%; 0,33W                                                                                                                                   | B 51264 A 10 K 5/2      |
| R 5,9                                                                              | 2  | 200kΩ ±5%; 0,15W                                                                                                                                  | B 51262 A 200 K 5/2     |

Schichtwiderstand  
LAYER-TYPE RESISTOR

|               |   |                                                                                          |                      |
|---------------|---|------------------------------------------------------------------------------------------|----------------------|
| R 8,52<br>128 | 3 | 200Ω $\pm 5\%$ ; 0,33W                                                                   | B 51264 A 200 Ω 5/2  |
| R 11,102      | 2 | 12,5kΩ $\pm 5\%$ ; 0,25W                                                                 | B 51263 A 12,5 K 5/2 |
| R 12          | 1 | 26Ω $\pm 1\%$ ; 0,15W                                                                    | B 51264 A 26 Ω 1/0,5 |
| R 13          | 1 | Thernewid<br>THERNEWID THERMISTOR<br>$R_{20}=2k\Omega \pm 5\%$ ; $T_k - 3,8\%/^{\circ}C$ | K 11 5% 2 K 3,8      |

Schichtwiderstand  
LAYER-TYPE RESISTOR

|      |   |                                                                          |                       |
|------|---|--------------------------------------------------------------------------|-----------------------|
| R 14 | 1 | 30kΩ $\pm 1\%$ ; 0,1W                                                    | B 51263 A 30 K 1/0,5  |
| R 15 | 1 | 160Ω $\pm 1\%$ ; 0,1W                                                    | B 51263 A 160 Ω 1/0,5 |
| R 16 | 1 | 900Ω $\pm 1\%$ ; 0,1W                                                    | B 51263 A 900 Ω 1/0,5 |
| R 17 | 1 | 1,5kΩ $\pm 1\%$ ; 0,1W                                                   | B 51263 A 1,5 K 1/0,5 |
| R 18 | 1 | Draht-Drehwiderstand<br>WIRE-WOUND VAR RESISTOR<br>1kΩ $\pm 10\%$ ; 0,5W | 1 kΩ Ms wd 70h        |

Schichtwiderstand  
LAYER-TYPE RESISTOR

|                             |   |                                                               |                             |
|-----------------------------|---|---------------------------------------------------------------|-----------------------------|
| R 19                        | 1 | 300Ω $\pm 1\%$ ; 0,1W                                         | B 51263 A 300 Ω 1/0,5       |
| R 20,28<br>32,97<br>100,155 | 6 | 100kΩ $\pm 5\%$ ; 0,15W                                       | B 51262 A 100 K 5/2         |
| R 21                        | 1 | 50kΩ $\pm 5\%$ ; 0,15W                                        | B 51262 A 50 K 5/2          |
| R 22,23                     | 2 | 600Ω $\pm 1\%$ ; 0,15W                                        | B 51264 A 600 Ω 1/0,5       |
| R 24                        | 1 | 5kΩ $\pm 5\%$ ; 0,33W                                         | B 51264 A 5 K 5/2           |
| R 25,92<br>153              | 3 | 1kΩ $\pm 5\%$ ; 0,5W                                          | B 51265 A 1 K 5/2           |
| R 26                        | 1 | Drahtwiderstand<br>WIRE-WOUND RESISTOR<br>3kΩ $\pm 5\%$ ; 20W | GWS20 3 K 5% (Fa.Rosenthal) |

Schichtwiderstand  
LAYER-TYPE RESISTOR

|                    |   |                         |                     |
|--------------------|---|-------------------------|---------------------|
| R 31               | 1 | 3kΩ $\pm 5\%$ ; 1W      | B 51266 A 3 K 5/2   |
| R 34               | 1 | 160 Ω $\pm 5\%$ ; 0,25W | B 51263 A 160 Ω 5/2 |
| R 35               | 1 | 3kΩ $\pm 5\%$ ; 0,5W    | B 51265 A 3 K 5/2   |
| R 36               | 1 | 100Ω $\pm 5\%$ ; 0,33W  | B 51264 A 100 Ω 5/2 |
| R 37               | 1 | 50Ω $\pm 1\%$ ; 0,25W   | B 51263 A 50 Ω 1/2  |
| R 38,62<br>109,120 | 4 | 2kΩ $\pm 5\%$ ; 0,33W   | B 51264 A 2 K 5/2   |
| R 40               | 1 | 50Ω $\pm 5\%$ ; 0,33W   | B 51264 A 50 Ω 5/2  |

Schichtwiderstand  
LAYER-TYPE RESISTOR

|                                          |   |                                                                                  |                               |
|------------------------------------------|---|----------------------------------------------------------------------------------|-------------------------------|
| R 42,83,84<br>95<br>143                  | 5 | 1k $\Omega$ $\pm$ 5%; 0,33W                                                      | B 51264 A 1 K 5/2             |
| R 43                                     | 1 | 300k $\Omega$ $\pm$ 5%; 0,25W                                                    | B 51263 A 300 K 5/2           |
| R 44                                     | 1 | 80k $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 80 K 5/2            |
| R 45                                     | 1 | 10 $\Omega$ $\pm$ 5%; 0,15W                                                      | B 51262 A 10 $\Omega$ 5/2     |
| R 46                                     | 1 | 60k $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 60 K 5/2            |
| R 50                                     | 1 | 10k $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 10 K 5/2            |
| R 51,151                                 | 2 | 100 $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 100 $\Omega$ 5/2    |
| R 53,56<br>64,67,157                     | 5 | 10k $\Omega$ $\pm$ 5%; 0,15W                                                     | B 51262 A 10 K 5/2            |
| R 54                                     | 1 | 150k $\Omega$ $\pm$ 5%; 0,25W                                                    | B 51263 A 150 K 5/2           |
| R 55                                     | 1 | 33k $\Omega$ $\pm$ 5%; 0,33W                                                     | B 51264 A 33 K 5/2            |
| R 57                                     | 1 | Schicht-Drehwiderstand<br>LAYER-TYPE VAR RESISTOR<br>50k $\Omega$ +20/-30%; 0,1W | 50 K lin Rel wd 165a          |
| Schichtwiderstand<br>LAYER-TYPE RESISTOR |   |                                                                                  |                               |
| R 58                                     | 1 | 8k $\Omega$ $\pm$ 5%; 0,25W                                                      | B 51263 A 8 K 5/2             |
| R 59                                     | 1 | 1,2k $\Omega$ $\pm$ 2%; 0,15W                                                    | B 51262 A 1,2 K 2/2           |
| R 61,124                                 | 2 | 200 $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 200 $\Omega$ 5/2    |
| R 63,66                                  | 2 | 200 $\Omega$ $\pm$ 5%; 0,15W                                                     | B 51262 A 200 $\Omega$ 5/2    |
| R 65                                     | 1 | Schicht-Drehwiderstand<br>LAYER-TYPE VAR RESISTOR<br>500 $\Omega$ +20/-30%; 0,1W | 500 $\Omega$ lin Rel wd 165a  |
| Schichtwiderstand<br>LAYER-TYPE RESISTOR |   |                                                                                  |                               |
| R 68<br>107,149,156                      | 4 | 400k $\Omega$ $\pm$ 5%; 0,25W                                                    | B 51263 A 400 K 5/2           |
| R 69,74,98<br>125,144                    | 5 | 500k $\Omega$ $\pm$ 5%; 0,25W                                                    | B 51263 A 500 K 5/2           |
| R 72,79                                  | 2 | 50k $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 50 K 5/2            |
| R 77,81                                  | 2 | 3k $\Omega$ $\pm$ 5%; 0,25W                                                      | B 51263 A 3 K 5/2             |
| R 78,135                                 | 2 | 500 $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 500 $\Omega$ 5/2    |
| R 82                                     | 1 | Schicht-Drehwiderstand<br>LAYER-TYPE VAR RESISTOR<br>25k $\Omega$ +20/-30%; 0,1W | 25 k $\Omega$ lin Rel wd 165a |
| Schichtwiderstand<br>LAYER-TYPE RESISTOR |   |                                                                                  |                               |
| R 88                                     | 1 | 5k $\Omega$ $\pm$ 5%; 0,25W                                                      | B 51263 A 5 K 5/2             |
| R 96<br>122                              | 2 | 125k $\Omega$ $\pm$ 5%; 0,25W                                                    | B 51263 A 125 K 5/2           |

Schichtwiderstand  
LAYER-TYPE RESISTOR

|                     |   |                                                                                                                                    |                                 |
|---------------------|---|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| R 104               | 1 | 150Ω $\pm 5\%$ ; 0,25W                                                                                                             | B 51263 A 150 Ω 5/2             |
| R 105<br>110<br>133 | 3 | 500Ω $\pm 5\%$ ; 0,33W                                                                                                             | B 51264 A 500 Ω 5/2             |
| R 108<br>150        | 2 | 60kΩ $\pm 5\%$ ; 0,15W                                                                                                             | B 51262 A 60 K 5/2              |
| R 109<br>120        | 2 | 2kΩ $\pm 5\%$ ; 0,33W                                                                                                              | B 51264 A 2 K 5/2               |
| R 121               | 1 | 125Ω $\pm 5\%$ ; 0,25W                                                                                                             | B 51263 A 125 Ω 5/2             |
| R 130, 131          | 2 | 2MΩ $\pm 10\%$ ; 0,25W                                                                                                             | B 51263 A 2 M 10/5              |
| R 138               | 1 | ...kΩ $\pm 5\%$ ; 0,25W<br>Wert wie eingebaut<br>VALUE AS MOUNTED                                                                  | B 51263 A ... K 5/2             |
| R 141               | 1 | 250Ω $\pm 5\%$ ; 0,25W                                                                                                             | B 51263 A 250 Ω 5/2             |
| R 145               | 1 | 25Ω $\pm 5\%$ ; 0,25W                                                                                                              | B 51263 A 25 Ω 5/2              |
| R 148<br>154        | 2 | 300Ω $\pm 5\%$ ; 0,33W                                                                                                             | B 51264 A 300 Ω 5/2             |
| R 160               | 1 | 100kΩ $\pm 5\%$ ; 0,25W                                                                                                            | B 51263 A 100 K 5/2             |
| R 161               | 1 | ...kΩ $\pm 5\%$ ; 0,25W<br>Wert wie eingebaut<br>VALUE AS MOUNTED                                                                  | B 51263 A ... K 5/2             |
| RL 1                | 1 | <b>Regellampe</b><br>REGULATING LAMP<br>R <sub>70mA</sub> = 40-52Ω                                                                 | 9 Rel 1p 19a<br>Rel Bv 674 A 22 |
| S 4                 | 1 | Kleindrehschalter<br>MIDGET ROTARY SWITCH<br>2polig; 2 Ebenen; 12stufig<br>2-POLE; 2-DECK; 12-STEP                                 | Rel sch 176b Form A             |
|                     |   | Schalenkernspule<br>POT-CORE COIL                                                                                                  |                                 |
| Ü 1                 | 1 | Wickl. I (1,5,2)<br>90 Wdg 0,20 Cu2L 1,8Ω<br>9,7mH<br>Abgriff (5): 30 Wdg                                                          | Rel Bv 622 N 3154               |
| Ü 2                 | 1 | Wickl. I (2,3)<br>70 Wdg 0,34 CuL 0,53Ω<br>1,08mH $\pm 2\%$<br>Wickl. II (4,6,5)<br>5 Wdg 0,34 CuL 0,06Ω<br>Abgriff (6): 2 1/2 Wdg | Rel Bv 622 N 3153               |

|      |   |                                                                                                                                                                           |                            |
|------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
|      |   | Schalenkernspule<br>POT-CORE COIL                                                                                                                                         |                            |
| Ü 3  | 1 | Wickl. Ia, Ib(1,2)(3,4)<br>4 Wdg 2x0,40 Cu2L verdr. 0,03Ω<br>Ia+Ib 8μH<br>Ia=Ib ±0,1μH                                                                                    | Rel Bv 622 N 3214          |
| Ü 4  | 1 | Wickl. I (1,6)<br>12 Wdg 0,40 Cu2L 0,65Ω<br>6,9μH<br><br>Wickl. IIa, IIb(4,5)(5,3)<br>6 Wdg 2x0,40 Cu2L verdr. 0,45Ω<br>IIa= 1,73μH<br>IIa=IIb ±0,1μH<br>IIa+IIb=I ±0,8μH | Rel Bv 622 N 3152          |
| Ü 11 | 1 | Wickl. I (3,4)<br>6 Wdg 0,40 Cu2L 0,04Ω<br>1,48μH ±5%<br><br>Wickl. II (2,1)<br>2 Wdg 0,40 Cu2L 0,02Ω<br>I+II 2,6-2,9μH                                                   | Rel Bv 622 N 3151          |
| C,D  | 2 | Kammrelais<br>CRADLE RELAY<br>7700 Wdg 0,06 CuL 1250Ω                                                                                                                     | T rls 162a T Bv 65422/121d |

Abstimmeinheit I Rel 35 D 366f 1a  
TUNING UNIT I

(Ausgabe I)  
(ISSUE I)

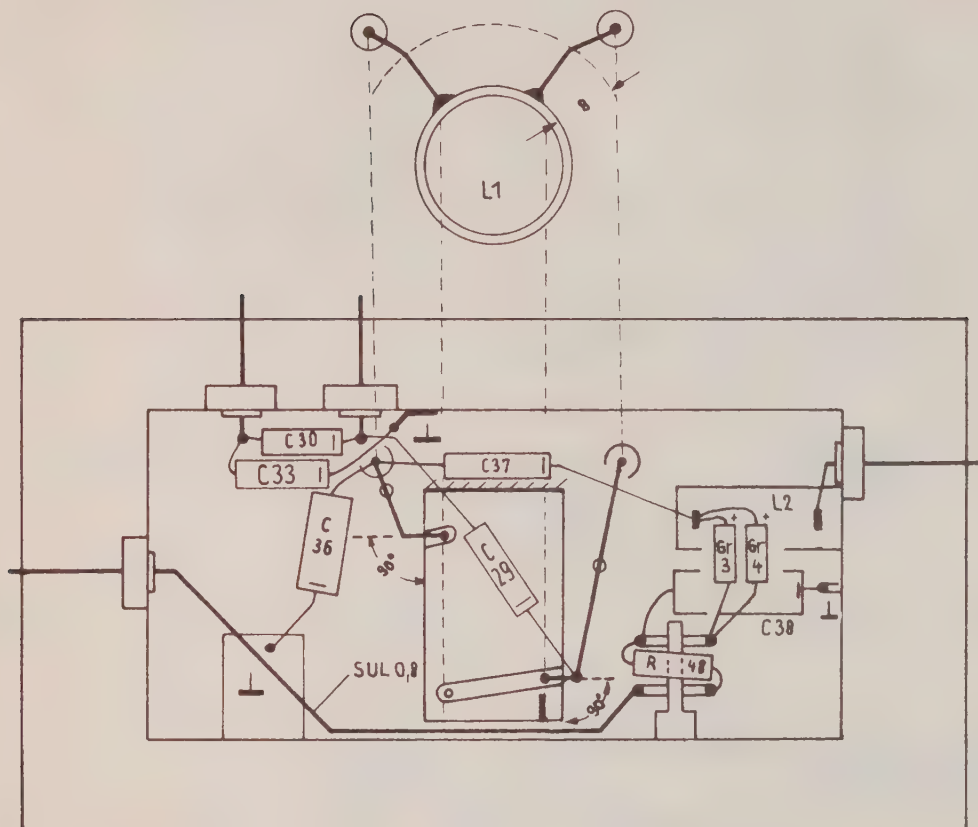
|         |   |                                                                  |                      |
|---------|---|------------------------------------------------------------------|----------------------|
|         |   | Keramik-Kondensator<br>CERAMIC CAPACITOR                         |                      |
| C 29,30 | 2 | 160pF ±1%; 500V-                                                 | B 38223 NPO H 160 F  |
| C 33    | 1 | 200pF ±2%; 500V-                                                 | B 38223 N330 G 200 G |
| C 36    | 1 | 35pF ±5%; 500V-                                                  | B 38223 NPO D 35 J   |
| C 37    | 1 | 20pF ±5%; 500V-                                                  | B 38223 NPO C 20 J   |
| C 38    | 1 | Styroflex-Kondensator<br>STYROFLEX CAPACITOR<br>500pF ±5%; 125V- | B31140-A1501-J       |
| Gr 3,4  | 2 | VARIO CAP<br>0,1-80V / 12-120pF                                  | HC 7002 (Fa.Hughes)  |
| L 1     | 1 | Keramik-Spule<br>CERAMIC COIL<br>0,4μH ±10%                      | Rel Bv 623 G 3056    |

|   |   |   |                  |      |
|---|---|---|------------------|------|
| L | 2 | 1 | HF-Spule         |      |
|   |   |   | RF COIL          |      |
|   |   |   | 100 Wdg 0,08 CuL | 7,9Ω |
|   |   |   | 40μH             |      |

Rel Bv 623 A 3156

|      |   |                                                              |
|------|---|--------------------------------------------------------------|
| R 48 | 1 | Schichtwiderstand<br>LAYER-TYPE RESISTOR<br>100kΩ +5%; 0,15W |
|------|---|--------------------------------------------------------------|

B 51262 A 100 K 5/2



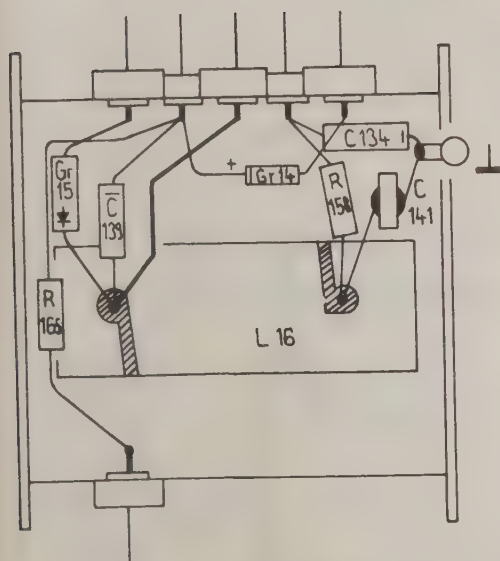
Abstimmereinheit I Rel ms 35 D 366f 1a (Ausgabe I)  
TUNING UNIT I Rel ms 35 D 366f 1a (ISSUE I)

Abstimmereinheit II Rel 35 D 372f 1a  
TUNING UNIT II

(Ausgabe I)

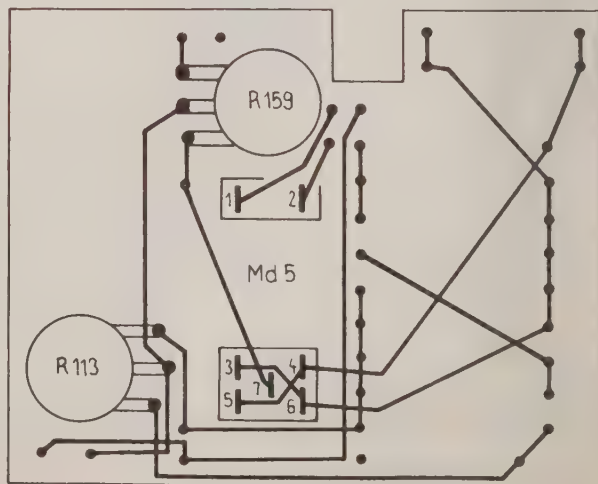
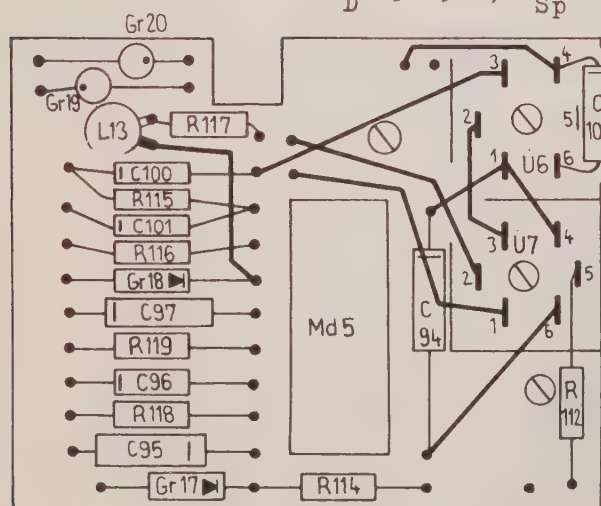
(ISSUE I)

|              |   |                                                                                          |                        |
|--------------|---|------------------------------------------------------------------------------------------|------------------------|
|              |   | Keramik-Kondensator<br>CERAMIC CAPACITOR                                                 |                        |
| C 134        | 1 | 125pF $\pm 5\%$ ; 500V-                                                                  | B 38501 N750 F 125 J   |
| C 139        | 1 | 12,5pF $\pm 5\%$ ; 500V-                                                                 | B 38501 N150 D 12,5 J  |
| C 141        | 1 | Keramik-Scheibenkondensator<br>CERAMIC DISC-TYPE CAPACITOR<br>2000pF $+30/-20\%$ ; 500V- | B 37638 L 2000 R       |
| Gr 14        | 1 | VARIO CAP<br>0,1-80V / 12-120pF                                                          | HC 7002 (Fa.Hughes)    |
| Gr 15        | 1 | Richtleiter<br>CRYSTAL DIODE<br>$J_D = 6\text{mA}$ ; $U_{Sp} = 30\text{V}$               | OA 159 (Fa.Telefunken) |
| L 16         | 1 | Keramik-Spule<br>CERAMIC COIL<br>$3\mu\text{H} \pm 10\%$                                 | Rel Bv 623 G 3055      |
| R 158<br>165 | 2 | Schichtwiderstand<br>LAYER-TYPE RESISTOR<br>$10\text{k}\Omega \pm 5\%$ ; 0,15W           | B 51262 A 10 K 5/2     |



Abstimmereinheit II Rel ms 35 D 372f 1a (Ausgabe I)  
TUNING UNIT II Rel ms 35 D 372f 1a (ISSUE I)

|           |   |                                                                                                  |                   |
|-----------|---|--------------------------------------------------------------------------------------------------|-------------------|
|           |   | MKL-Kondensator<br>MKL CAPACITOR                                                                 |                   |
| C 94      | 1 | 0,47 $\mu$ F $\pm$ 20%; 63V-                                                                     | B32110-D9474-M    |
| C 95,97   | 2 | 0,1 $\mu$ F $\pm$ 20%; 100V-                                                                     | B32110-C0104-M    |
|           |   | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR                                                         |                   |
| C 96      | 1 | 320pF $\pm$ 1%; 125V-                                                                            | B31140-A1321-F    |
| C 100,101 | 2 | 1000pF $\pm$ 1%; 125V-                                                                           | B31140-A1102-F    |
| C 102     | 1 | MKH-Kondensator<br>MKH CAPACITOR<br>0,047 $\mu$ F $\pm$ 20%; 300V-                               | B32220-A3473-M    |
| Gr 17,18  | 2 | Germanium-Richtleiter<br>GERMANIUM CRYSTAL DIODE<br>$J_D = 5\text{mA}$ ; $U_{Sp} = 40\text{V}$ - | GD 1 E            |
| Gr 19,20  | 2 | Silizium-Diode<br>SILICON DIODE<br>$J_D = 190\text{mA}$ ; $U_{Sp} = 100\text{V}$                 | BAY 29            |
| L 13      | 1 | HF-Spule<br>RF COIL<br>668 Wdg 0,12 CuL 26 $\Omega$<br>1,8mH                                     | Rel Bv 623 A 3242 |
| Md 5      | 1 | Modulator<br>MODULATOR<br>$J_D = 5-15\text{mA}$ ; $U_{Sp} = 25\text{V}$                          | Rel Bv 672 R 21   |



|           |   |                                                                                  |                            |
|-----------|---|----------------------------------------------------------------------------------|----------------------------|
| R 113     | 1 | Schicht=Drehwiderstand<br>LAYER=TYPE VAR RESISTOR<br>50k $\Omega$ +20/-30%; 0,1W | 50 K lin Rel wd 165a       |
|           |   | Schichtwiderstand<br>LAYER=TYPE RESISTOR                                         |                            |
| R 112     | 1 | 400 $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 400 $\Omega$ 5/2 |
| R 114     | 1 | 2k $\Omega$ $\pm$ 2%; 0,25W                                                      | B 51263 A 2 K 2/2          |
| R 115,116 | 2 | 1k $\Omega$ $\pm$ 1%; 0,1W                                                       | B 51263 A 1 K 1/0,5        |
| R 117     | 1 | 2,7k $\Omega$ $\pm$ 2%; 0,25W                                                    | B 51263 A 2,7 K 2/2        |
| R 118     | 1 | 10k $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 10 K 5/2         |
| R 119     | 1 | 50k $\Omega$ $\pm$ 5%; 0,25W                                                     | B 51263 A 50 K 5/2         |
| R 159     | 1 | Schicht=Drehwiderstand<br>LAYER=TYPE VAR RESISTOR<br>25k $\Omega$ +20/-30%; 0,1W | 25 K lin Rel wd 165a       |

Übertrager  
TRANSFORMER

|     |   |                                                                                                                                                           |                   |
|-----|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Ü 6 | 1 | Wickl. I (3,2)<br>45 Wdg 0,24 CuL 0,6 $\Omega$<br>2,43mH<br><br>Wickl. IIa,IIb(6,4)(4,1)<br>15 Wdg 2x0,24 CuL verdr.<br>IIa=IIb $\pm$ 0,02mH              | Rel Bv 622 N 3150 |
| Ü 7 | 1 | Wickl. I (6,3)<br>45 Wdg 0,24 CuL 0,6 $\Omega$<br>2,43mH<br><br>Wickl. IIa,IIb(1,4)(4,2)<br>15 Wdg 2x0,24 CuL verdr.0,27 $\Omega$<br>IIa=IIb $\pm$ 0,02mH | Rel Bv 622 N 3296 |

Tiefpaß 150 kHz Rel 35 D 396f 1a  
LOW-PASS FILTER 150 KC/S

(Ausgabe I)  
(ISSUE I)

|       |   |                                                                                                                  |                   |
|-------|---|------------------------------------------------------------------------------------------------------------------|-------------------|
| C 142 | 1 | Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR<br>190pF $\pm$ 1%; 125V-                                                | B31140-A1191-F    |
| C 149 | 1 | MKL-Kondensator<br>MKL CAPACITOR<br>0,1 $\mu$ F $\pm$ 20%; 100V-<br><br>Kf-Kondensator<br>PLASTIC-FOIL CAPACITOR | B32110-C0104-M    |
| C 150 | 1 | 2230pF $\pm$ 1%; 125V-                                                                                           | B31141-A1222-F300 |
| C 151 | 1 | 3070pF $\pm$ 1%; 125V-                                                                                           | B31141-A1302-F700 |
| C 152 | 1 | 1170pF $\pm$ 1%; 125V-                                                                                           | B31141-A1112-F700 |

Kf-Kondensator  
PLASTIC-FOIL CAPACITOR

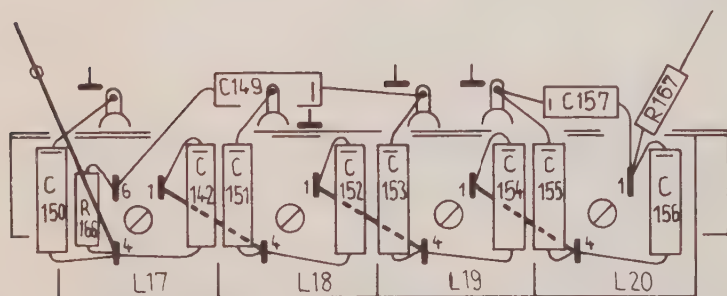
|       |   |                          |                   |
|-------|---|--------------------------|-------------------|
| C 153 | 1 | 2350pF $\pm 1\%$ ; 125V- | B31141-A1232-F500 |
| C 154 | 1 | 1570pF $\pm 1\%$ ; 125V- | B31140-A1152-F700 |
| C 155 | 1 | 2570pF $\pm 1\%$ ; 125V- | B31141-A1252-F700 |
| C 156 | 1 | 715pF $\pm 1\%$ ; 125V-  | B31140-A1711-F500 |
| C 157 | 1 | 1820pF $\pm 1\%$ ; 125V- | B31140-A1182-F200 |

Spule  
COIL

|      |   |                                                                               |                   |
|------|---|-------------------------------------------------------------------------------|-------------------|
| L 17 | 1 | Wickl. I (1,4)<br>52 Wdg HFL S 20x0,07 0,50 $\Omega$<br>827 $\mu$ H $\pm 1\%$ | Rel Bv 622 N 3354 |
| L 18 | 1 | Wickl. I (1,4)<br>44 Wdg HFL S 45x0,05 0,38 $\Omega$<br>597 $\mu$ H $\pm 1\%$ | Rel Bv 622 N 3355 |
| L 19 | 1 | Wickl. I (1,4)<br>41 Wdg HFL S 30x0,07 0,28 $\Omega$<br>513 $\mu$ H $\pm 1\%$ | Rel Bv 622 N 3356 |
| L 20 | 1 | Wickl. I (1,4)<br>46 Wdg HFL S 45x0,05 0,42 $\Omega$<br>649 $\mu$ H $\pm 1\%$ | Rel Bv 622 N 3357 |

Schichtwiderstand  
LAYER-TYPE RESISTOR

|       |   |                                |                            |
|-------|---|--------------------------------|----------------------------|
| R 166 | 1 | 600 $\Omega$ $\pm 5\%$ ; 0,25W | B 51263 A 600 $\Omega$ 5/2 |
| R 167 | 1 | 400 $\Omega$ $\pm 5\%$ ; 0,25W | B 51263 A 400 $\Omega$ 5/2 |



Tiefpaß 150 kHz Rel ms 35 D 396f 1a (Ausgabe I)  
LOW-PASS FILTER 150 KC/S Rel ms 35 D 396f 1a (ISSUE I)

Kf-Kondensator  
PLASTIC-FOIL CAPACITOR

|      |   |                                                                    |                   |
|------|---|--------------------------------------------------------------------|-------------------|
| C 66 | 1 | 310pF $\pm 1\%$ ; 125V-                                            | B31140-A1311-F    |
| C 67 | 1 | 840pF $\pm 1\%$ ; 125V-                                            | B31140-A1841-F    |
| C 68 | 1 | 5600pF $\pm 1\%$ ; 125V-                                           | B31140-A1562-F    |
| C 69 | 1 | 7750pF $\pm 1\%$ ; 125V-                                           | B31140-A1772-F500 |
| C 70 | 1 | 4900pF $\pm 1\%$ ; 125V-                                           | B31141-A1492-F    |
| C 71 | 1 | MKL-Kondensator<br>MKL CAPACITOR<br>0,47 $\mu$ F $\pm 20\%$ ; 63V- | B32110-D9474-M    |

Schalenkernspule  
POT-CORE COIL

|     |   |                                                                         |                   |
|-----|---|-------------------------------------------------------------------------|-------------------|
| L 8 | 1 | Wickl. I (2,3)<br>96 Wdg HFL S 45x0,04 1,8 $\Omega$<br>3,38mH $\pm 1\%$ | Rel Bv 622 P 3124 |
| L 9 | 1 | Wickl. I (2,3)<br>90 Wdg HFL S 45x0,04 1,7 $\Omega$<br>3,01mH $\pm 1\%$ | Rel Bv 622 P 3125 |

Schichtwiderstand  
LAYER-TYPE RESISTOR

|       |   |                                |                            |
|-------|---|--------------------------------|----------------------------|
| R 86  | 1 | 800 $\Omega$ $\pm 5\%$ ; 0,25W | B 51263 A 800 $\Omega$ 5/2 |
| R 87  | 1 | 1k $\Omega$ $\pm 5\%$ ; 0,25W  | B 51263 A 1 K 5/2          |
| R 136 | 1 | 5k $\Omega$ $\pm 5\%$ ; 0,25W  | B 51263 A 5 K 5/2          |

Übertrager  
TRANSFORMER

|     |   |                                                                                                                                                                                                              |                   |
|-----|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Ü 5 | 1 | Wickl. I (1,5)<br>200 Wdg 0,15 CuL 10 $\Omega$<br>80mH<br><br>Wickl. II (4,2,6)<br>200 Wdg 0,15 CuL 11 $\Omega$<br>Abgriff (2): 100 Wdg<br>I=II $\pm 0,2$ mH                                                 | Rel Bv 622 P 3123 |
| Ü 9 | 1 | Wickl. I (4,3)<br>12 Wdg 0,40 Cu2L 0,65 $\Omega$<br>6,9 $\mu$ H<br><br>Wickl. IIa,IIb(1,6)(6,2)<br>6 Wdg 2x0,40 Cu2L verdr.0,45 $\Omega$<br>1,73 $\mu$ H<br><br>IIa=IIb= 0,1 $\mu$ H<br>IIa+IIb= 0,8 $\mu$ H | Rel Bv 622 N 3294 |

Übertrager  
TRANSFORMER

Rel Bv 622 N 3148

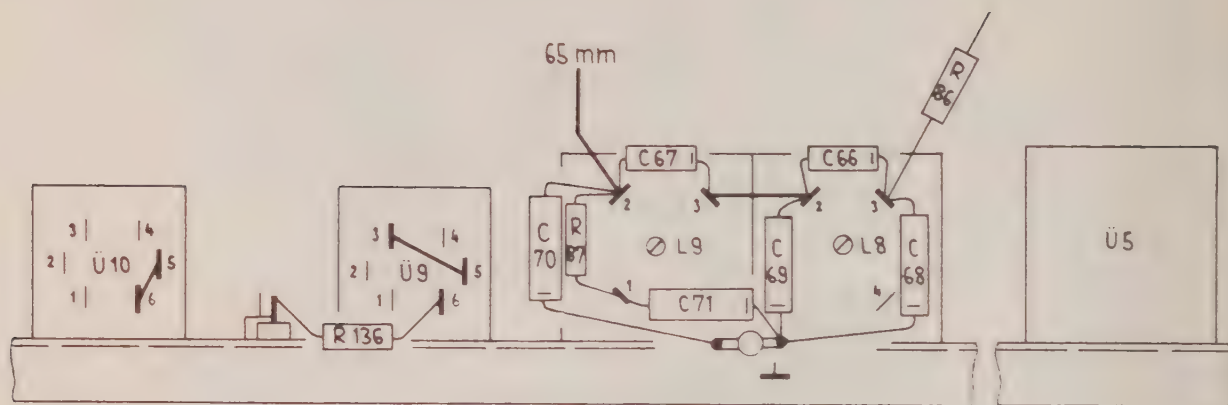
Wickl. I (1,2)

4 Wdg 0,50 CuL 0,018Ω

Wickl. IIa,IIb(4,5)(5,3)

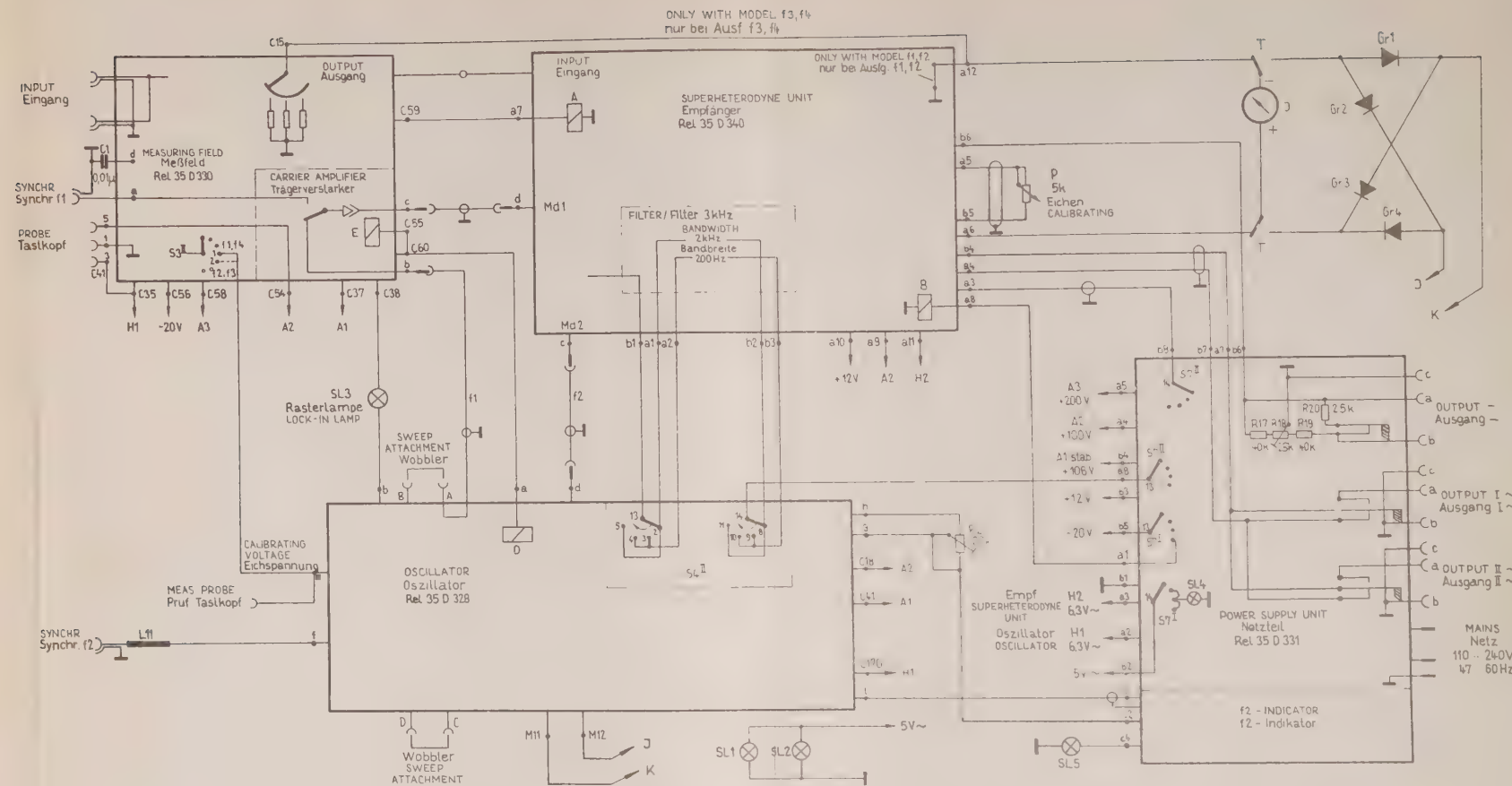
2 Wdg 2x0,50 CuL verdr. 0,012Ω

I+IIa+IIb 1,7-2,3μH



Tiefpaß 50 kHz Rel ms 35 D 438f 1a (Ausgabe I)

LOW-PASS FILTER 50 KC/S Rel ms 35 D 438f 1a (ISSUE I)



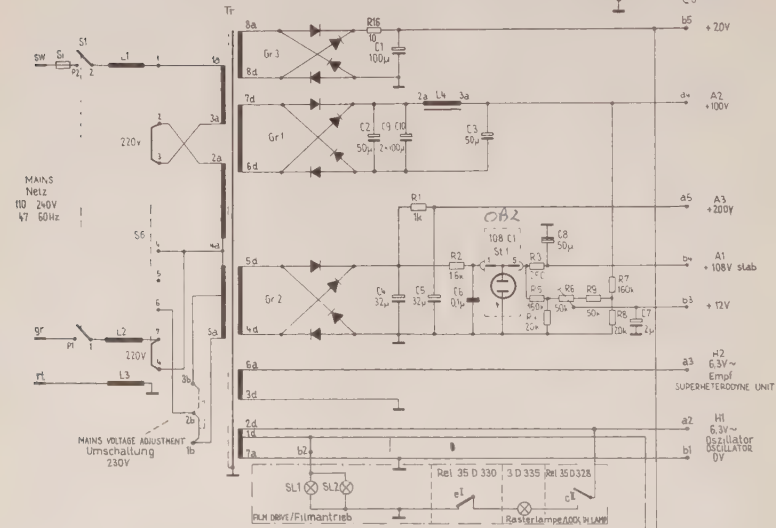
Pegelmesser  
LEVEL OSCILLATOR

Rel str 3 D 335 f

Dt/En

Ausgabe 11 3.6.65 Brehmer

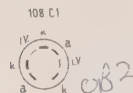




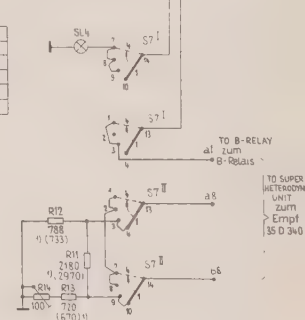
| Netz<br>MAINS | Kontakte / CONTACTS |   |   |   |   |   |   |   |
|---------------|---------------------|---|---|---|---|---|---|---|
|               | 1                   | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 110V          | —                   |   | — |   |   |   | — |   |
| 130V          | —                   |   | — |   |   |   | — |   |
| 220V          |                     | — |   |   |   |   |   | — |
| 240V          |                     | — |   |   |   |   | — |   |

S7

| Ausf / MODEL 1a |          | Ausf / MODEL 2a |          |
|-----------------|----------|-----------------|----------|
| Pos<br>Ste 5    | Ablesung | Pos<br>Ste 3    | Ablesung |
| 1               | ▼0       | 1               | ▼0       |
| 2               | -1np     | 2               | -10dB    |
| 3               | -2np     | 3               | -20dB    |
| 4               | -3np     | 4               | -30dB    |

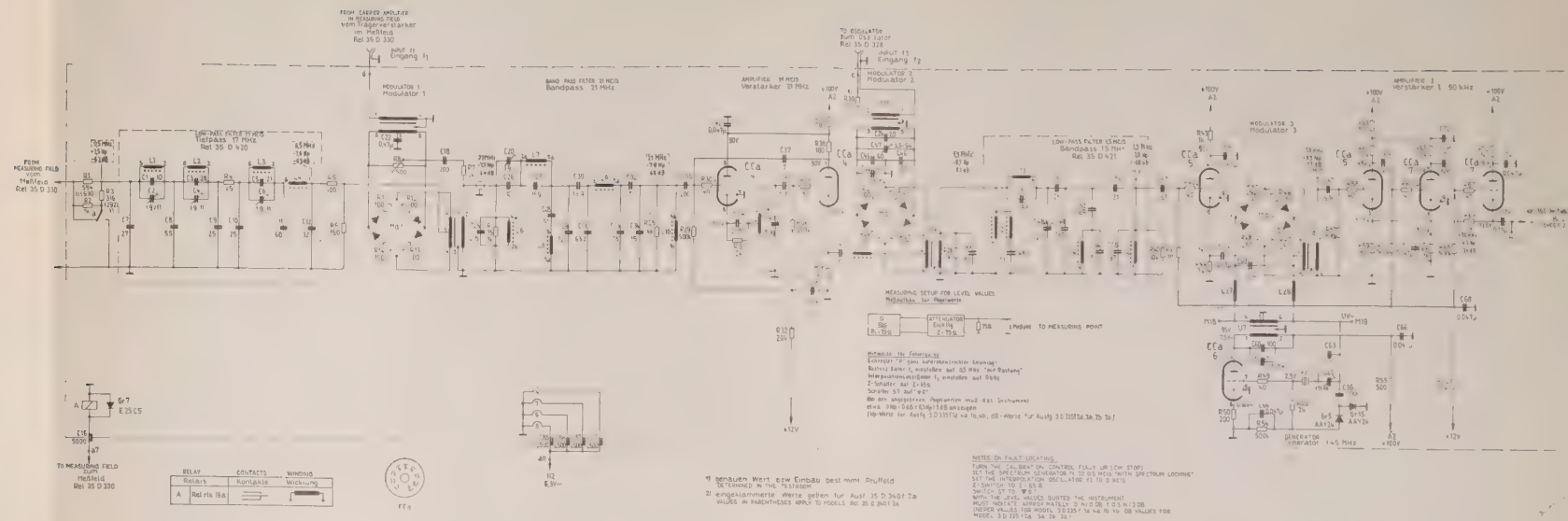


<sup>1)</sup> eingeklammerte Werte  
gelten nur für 35 D 331 f 2a  
VALUES IN PARENTHESES  
APPLY FOR MODEL 35 D 331 f 2a



Rel str 35 D 331 f 1a,2a. Dt/En





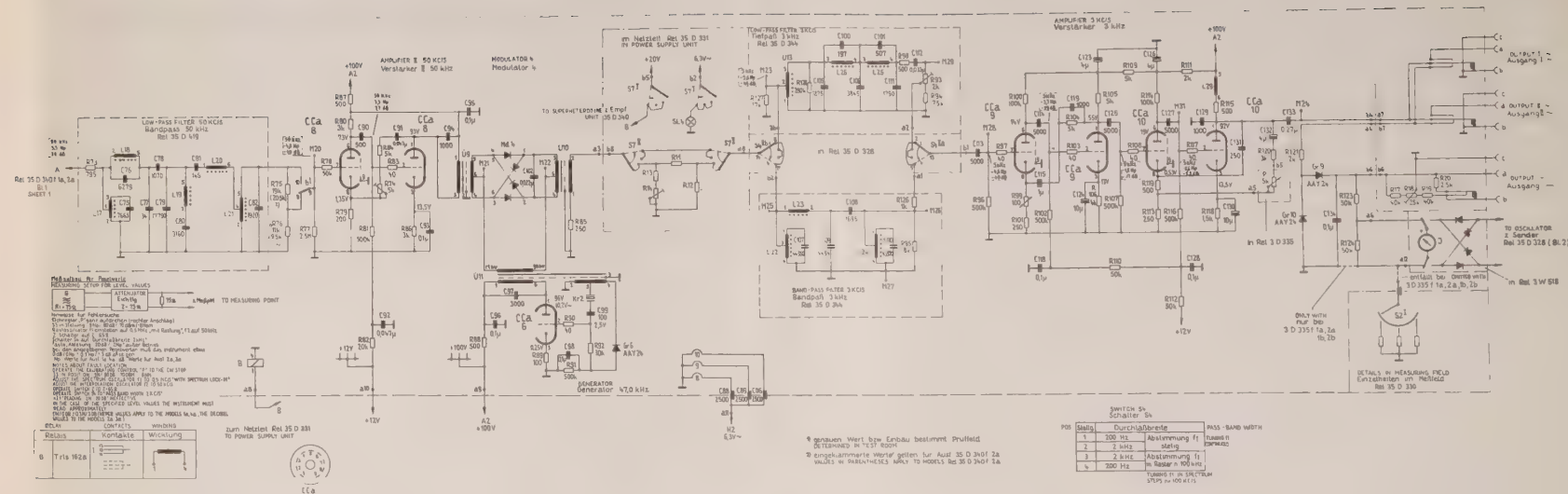
Empfänger  
SUPERHETERODYNE UNIT

Rel str 35 D 340f 1a,2a Dt/En Bl.1  
Sheet 1

Ausgabe 11 3.6.65 Brehmer

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Empfänger  
SUPERHETERODYNE UNIT

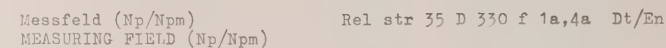
Rel str 35 D 340f 1a,2a Dt/En Bl.2  
Sheet 2

Ausgabe 11 3.6.65 Brehmer

Vervielfältigung dieser Unterlage sowie Verwertung und Mitteilung ihres Inhaltes unzulässig, soweit nicht ausdrücklich zugestanden. Zuwiderhandlungen sind strafbar und verpflichten zu Schadenersatz (LitUrRG, UWG, BGB). Alle Rechte für den Fall der Patenterteilung oder GM-Eintragung vorbehalten.

SIEMENS & HALSKE Aktiengesellschaft







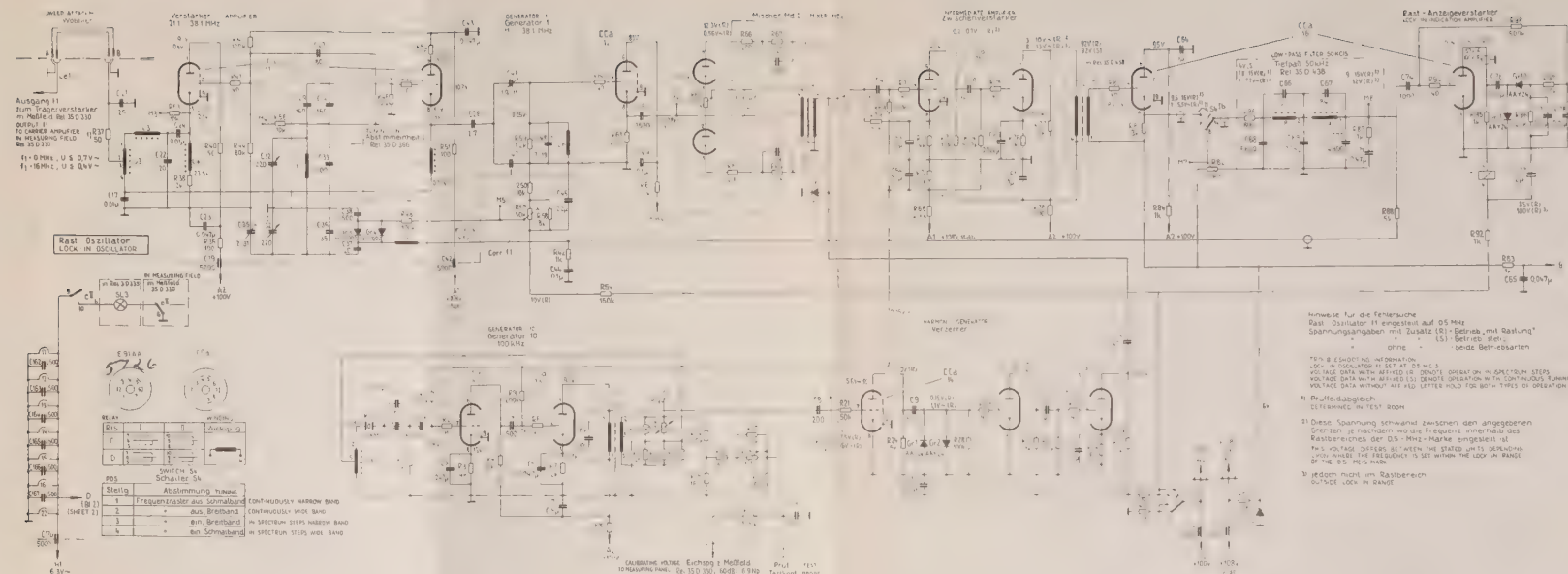


Meßfeld (dB,dBm) Relstr 35 D 330 f 2a,3a Dt,En

Ausgabe 11 3.6.65 Brehmer

Vervielfältigung dieser Unterlage sowie Verwertung und Mitteilung ihres Inhaltes unzulässig, soweit nicht ausdrücklich zugestanden. Zuwiderhandlungen sind strafbar und verpflichten zu Schadenersatz (LitURG, UWG, BGB). Alle Rechte für den Fall der Patenterteilung oder GM-Eintragung vorbehalten.

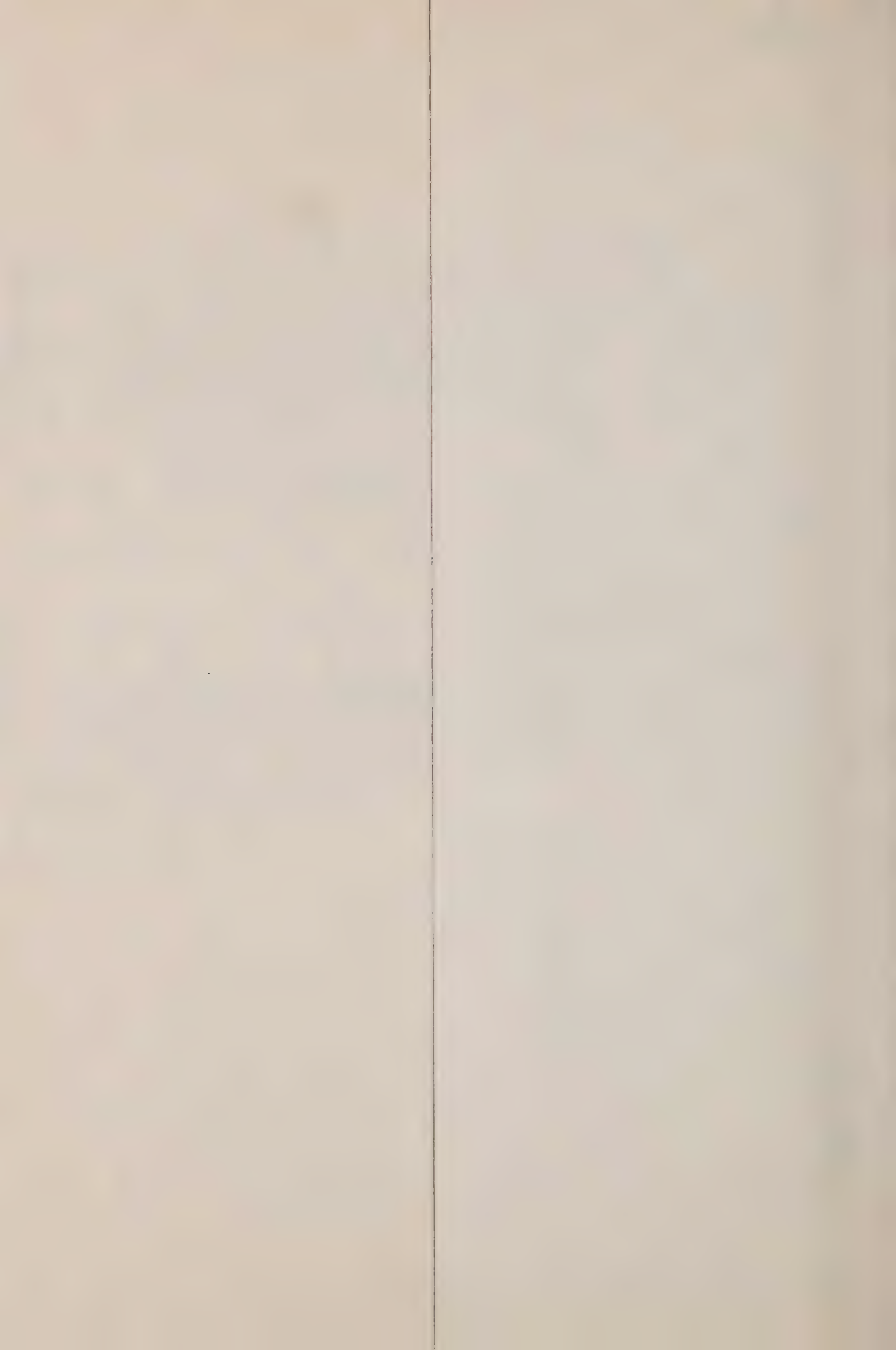




Oszillator Baugruppe  
OSCILLATOR SUBASSEMBLY

Rel str 35 D 328 f 1a Dt/En Bl.1  
Sheet 1

Ausgabe II 3.6.65 Breher





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uffeldabgleich  
TERMINED IN TEST ROOM

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uffeldabgleich  
TERMINED IN TEST ROOM

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uffeldabgleich  
TERMINED IN TEST ROOM





